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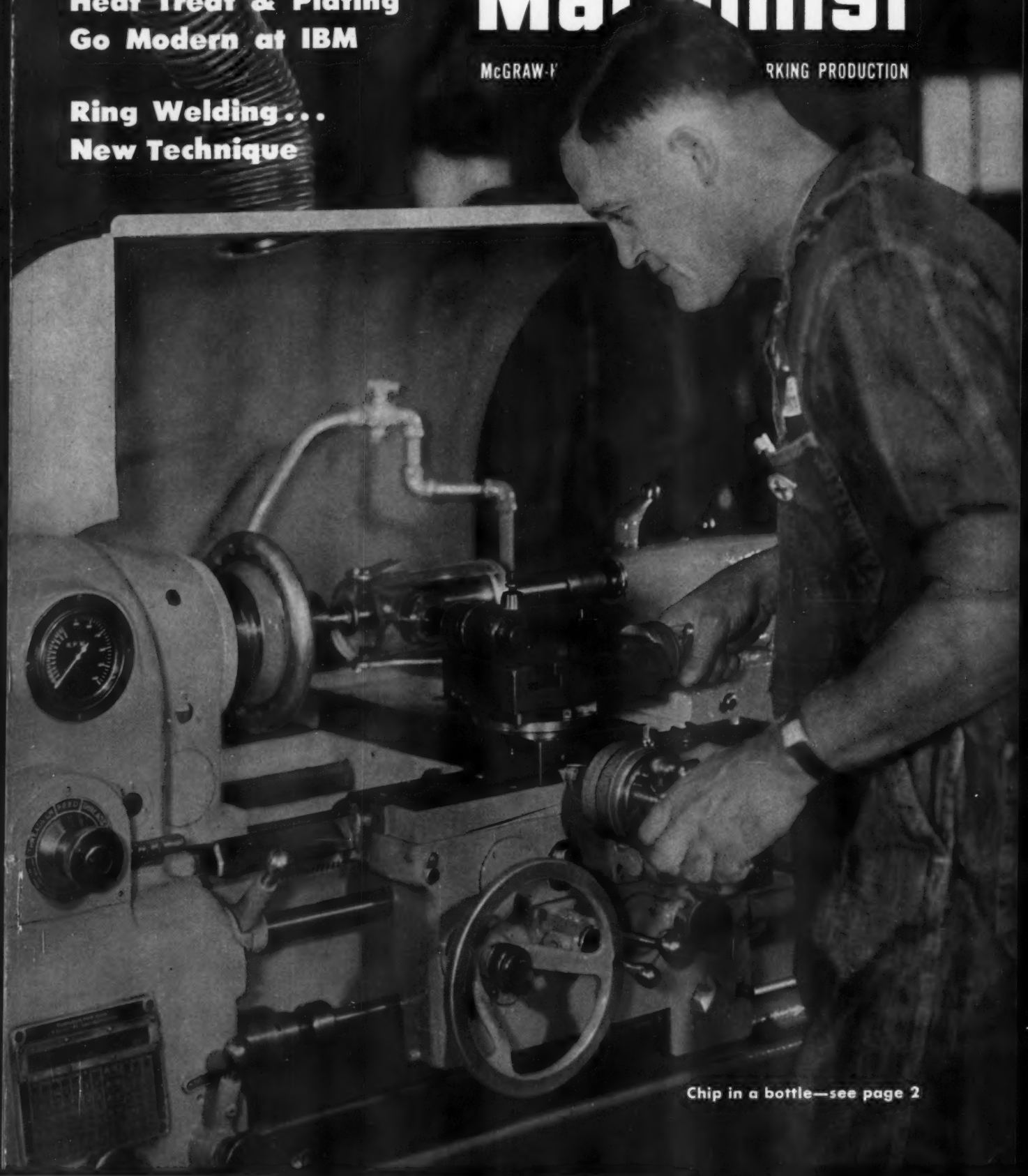
MARCH 28, 1955

American Machinist

McGRAW-H RKING PRODUCTION

Heat Treat & Plating Go Modern at IBM

Ring Welding... New Technique



Chip in a bottle—see page 2

stack loading + auto-chucking = 130 PARTS/HR

on this Heald Size-Matic

It's done on a Heald Model 170 Size-Matic with automatic chucking and stack loading. In this highly automated setup, the bores of steel bevel gears are precision ground at an estimated production rate of 130 per hour at 90% efficiency. Loading, locating, work-holding, grinding, sizing and unloading are all performed in a completely automatic cycle. Stack loading of these awkward-to-handle parts is a definite production advantage. A self-positioning workhead permits locating gears by pitch line of teeth to a special backing plate adapter.

This Model 170 automatic loading chuck-type internal is described in Bulletin No. 2-170-1, available on request.

Whether you need high production, high precision, or a combination of both . . .

It pays to come to Heald !

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MAGAZINE OF METALWORKING PRODUCTION

CONTENTS FOR MARCH 28, 1955

VOL 99, No. 7

ADMINISTRATION

111 EDITORIAL *Burnham Finney*
122 DOES MIST COOLING RISK OPERATOR HEALTH? *Harry F Schulte, and others*
137 'SICK LEAVE' OR VACATION *Round Table*
147 FIRE HAZARDS WITH TITANIUM

SPECIAL REPORT

125 HOW TO LAY OUT HEAT-TREATING AND PLATING DEPARTMENTS *Richard Trusler*

ENGINEERING

147 TOLERANCES FOR DIE CASTINGS

ASSEMBLY

113 RING-WELD YOUR SMALL ASSEMBLIES *J M Enyedy*

MATERIAL CUTTING, FORMING

118 NOW: LONG TAPERED BORES HONED TO 'TENTHS' *Watervliet Arsenal*
140 TREPANNING TOOL CUTS SHEET METAL *G R Milner*
141 EMERGENCY REPAIR FOR HAMMER HEAD *C Y Lee*
142 BALL-BEARING STOP SPEEDS CUTOFF OF THIN PARTS *Phil McCafferty*
143 DEBURRING TOOL HAS WIDE RANGE *D More*

INSPECTION

116 HARDNESS TESTER SORTS CASTINGS MAGNETICALLY *Milton J Diamond*
143 TAPERED PARALLELS GAGE ROLLERS *W I Morgan*

TOOLING

138 CLEAR PLASTIC ENCLOSURES CATCH "HOT" CHIPS AT ARGONNE
140 ANOTHER EASILY ADJUSTABLE BORING BAR *G R Milner*
140 WORK SHOP FOR PRESS TOOLS *S Sharcott*
141 TRUE-RUNNING TAPHOLDER AIDS AIRCRAFT JIG CONSTRUCTION *Robert J Lemp*
144 BUSHING AND TOOLHOLDER AID THREADING LONG SHAFT *Albert I Levitt*
144 SINE-BAR ATTACHMENT SETS PLANER *Nicholas DeCarlo*

NEWS OF METALWORKING

97 SPOT NEWS
99 WASHINGTON
101 DETROIT
103 MACHINE TOOLS
107 GAGING METALWORKING
154 NEWS OF METALWORKING
220 NAMES IN THE NEWS

DEPARTMENTS

90 BACKLASH
140 PRACTICAL IDEAS
147 REFERENCE BOOK SHEETS
153 TALKING SHOP
164 EQUIPMENT, MATERIALS, PARTS
180 ROUND TABLE DISCUSSION
210 NEW FILMS

NUMBER OF COPIES PRINTED THIS ISSUE 38,125

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American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc. James H McGraw (1860-1948), Founder. EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Donald C McGraw, President; Willard Chevalier, Executive Vice President; Joseph A Gerardi, Vice President, Treasurer; John J Cooke, Secretary; Paul Montgomery, Executive Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Nelson Bond, Vice President, Director of Advertising; J E Blackburn Jr, Vice President, Director of Circulation.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, N.Y. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Reentered as second-class matter, November 17, 1953, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

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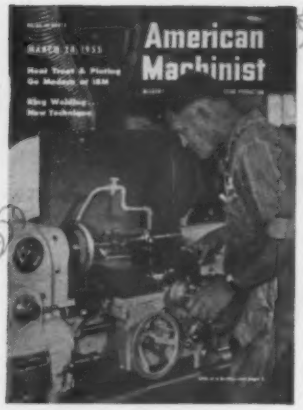


chips

HOT TURN . . . Our cover photo, taken at Argonne National Laboratories, Chicago, shows a lathe operation that would be simple—except that the part is radioactive, or a valuable material, or the chips must be saved for analysis. That means application of a special enclosure, as shown. Actually, there are three types of enclosures, all described in a 2-page article in this issue by Nils Bohlin and Herbert V Ross of the Lab. The hood behind the lathe is not necessary for this operation, but serves in others (see *AM*—Feb 19, '51, p133-135).

HEAT-TREAT COMPLETE . . . IBM decided to do its own heat treating and plating at Endicott, NY, to be sure of quality. For $6.5 million, IBM has doubled production, replaced 50% of equipment, allowed for 25% expansion, and put in the plushiest setup to date. Yet the setup will pay out in 10 yr in maintenance savings alone, and represents tomorrow's concepts. IBM's Plant Layout Dept tells the story in our 12-page Special Report. You probably won't be able to duplicate it, but there are dozens of ideas you can adapt. Reprints as usual.

RING WELDING . . . Spectacular in the process-improvement program at Remington-Rand Inc, Elmira, NY, is ring-welding an escapement wheel and pinion for typewriters. This replaces copper hydrogen brazing, avoiding copper-stripping and heat-treating problems. The secret is a sharp-edged hole in one piece mating with a fillet at the root of the stem on the other. The result is a ringlike weld from heat and pressure. The welding fixture is equipped with carbide nests made by the Sheffield Cavitron process, another development in production use of this equipment (*AM*—Aug 30 '54, p85-88). J M Enyedy (see biog), supt of mfg, told the story to Rupert LeGrand.

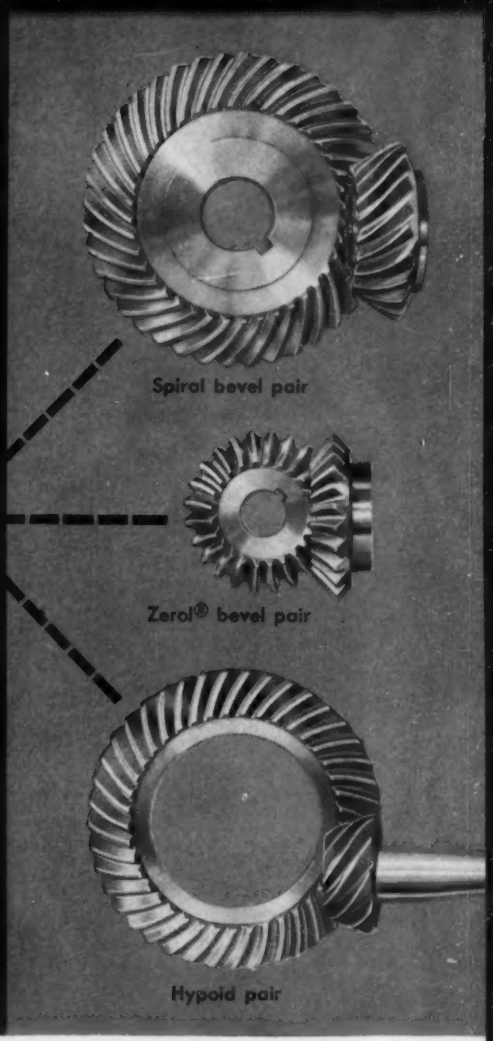
HARDNESS MAGNETICALLY . . . Milton J Diamond, research engineer of the Central Foundry Div, GMC, describes how a magnetic hardness tester was made and used. It eliminates spot grinding and Brinelling, plus manual handling. Here is automated sorting by hardness.

HEALTHY MIST? . . . Because of our extensive coverage of mist cooling, a number of readers have asked, "How about health of workers" Here is the answer as of now, as a result of a survey of experts.

AWARDS . . . American Machinist is proud to receive, for the second year in a row, the "Certificate of Special Merit" of the NY Employing Printers Assn, Inc, for "an outstanding example of printing . . ." We also have received a bronze plaque from the ASME in recognition of our part in formation of that Society, now celebrating its 75th year . . . American Ordnance Assn, which we sponsored in its formative period, also is about to have its 26th birthday.

COMING . . . April 11 *AM* will include a Special Report on Linear Programming, showing its application to Metalworking. There are also several unusual articles, one dealing with some typical problems in metrology, others on ultrasonics, Soviet machine-tool capacity, oil cleaning, belt-finishing fixtures, automatic size, proto-turning, and another instalment of Stanley Cope's series on draw dies.

Weld, No Braze . . . J M Enyedy had charge of manufacturing and assembly of the OX5 airplane motor for the Willys Morrow Company during WW1, and in 1918 was made general superintendent of the company, which manufactured transmissions, universal joints, differentials, and small parts for the Willys-Overland auto. He moved to Remington-Rand in 1936, became superintendent on war products in 1942. When war contracts were completed, he was appointed superintendent of manufacturing of typewriter and adding-machine parts. His description of the new technique of ring welding leads out this issue.



One cutter produced these three gear pairs!

The new Gleason No. 116 Hypoid Generator used *one* Unitool* Cutter to generate the three gear pairs shown above. Only five additional Unitool Cutters are needed on this generator to cut spiral and Zerol® bevel gears of any ratio, and hypoid gears of 3:1 ratio and higher; up to 18″ pitch diameter.

The Unitool Method was developed especially for use with the No. 116 Hypoid Generator, and its smaller counterpart, the No. 106 Hypoid Generator. This new method requires only a small tooling cost to cover the entire range of both machines.

It is intended for the production of small quantities of bevel and hypoid gears, and does not replace the cutting methods now in use for mass production. When using these methods, the No. 116 Generator is substantially faster than previous models.

In addition, the new features incorporated on the No. 116 offer simplification of tooth bearing development, improved quality, and much easier setup and operation.

We shall be glad to send more information on the No. 116 Hypoid Generator and the Unitool Method for producing small quantities of bevel gears.

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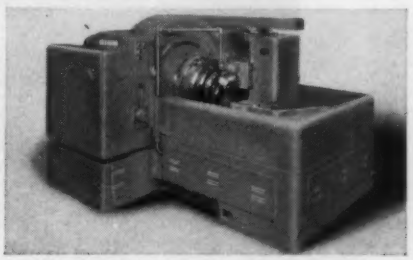


The No. 116 Hypoid Generator cuts spiral bevel, Zerol bevel and hypoid gears up to 18″ pitch diameter, any ratio up to 10:1, any pitch 2 DP and finer.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

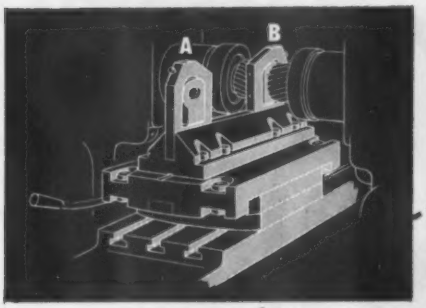
There's No Catch to this *Something*

CINCINNATI No. 2-24 DUPLEX AUTOMATIC MILLING MACHINE

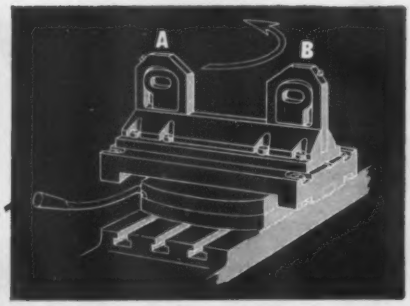
Milling two sides simultaneously, on cast iron pump parts at the rate of 60 per hour, employing the index base method of milling on a CINCINNATI No. 2-24 Automatic.

for Nothing
SETUP

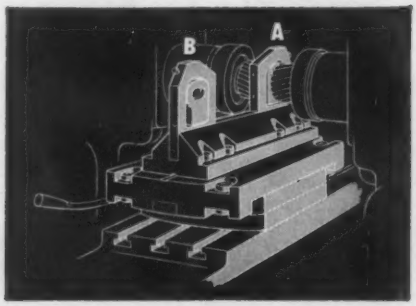
Milling the part in fixture B.
Plenty of time to reload fixture A.



Swiveling the Index Base table at end of cycle.



Milling the part in fixture A.
Plenty of time to reload fixture B.



Cost wise, the all-Cincinnati equipment illustrated here actually does give you something for nothing. The trick is accomplished with a setup that takes advantage of the free time during the feeding stroke of the table. The above drawings show how it works. ¶A CINCINNATI No. 2-24 Duplex Automatic Milling Machine is equipped with a Cincinnati Index Base (standard attachment) for the operation of milling two sides of pump parts. The entire production cycle proceeds along the following pattern: at the completion of the milling cut, the table automatically returns to starting position, the operator indexes the Index Base table 180°, and the cycle automatically repeats. **Notice that there's no time allowance for handling the work.** This item, usually a considerable cost factor, is free; accomplished while the cutters are at work. ¶This is a typical example of cost reduction by CINCINNATI No. 2-24 Automatic Milling Machines. They have many features of value in operating at rock-bottom costs:

Cycle selector unit . . . hundreds of variations; changed in a minute or less. **Automatic two-way table cycles. Single lever table control. Automatic spindle stop. Automatic backlash eliminator.**

How do the foregoing features strike you as potential cost reducers in your shop? You can get the entire No. 2-24 specifications and illustrated advantages by writing for catalog No. M-1760-1.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO

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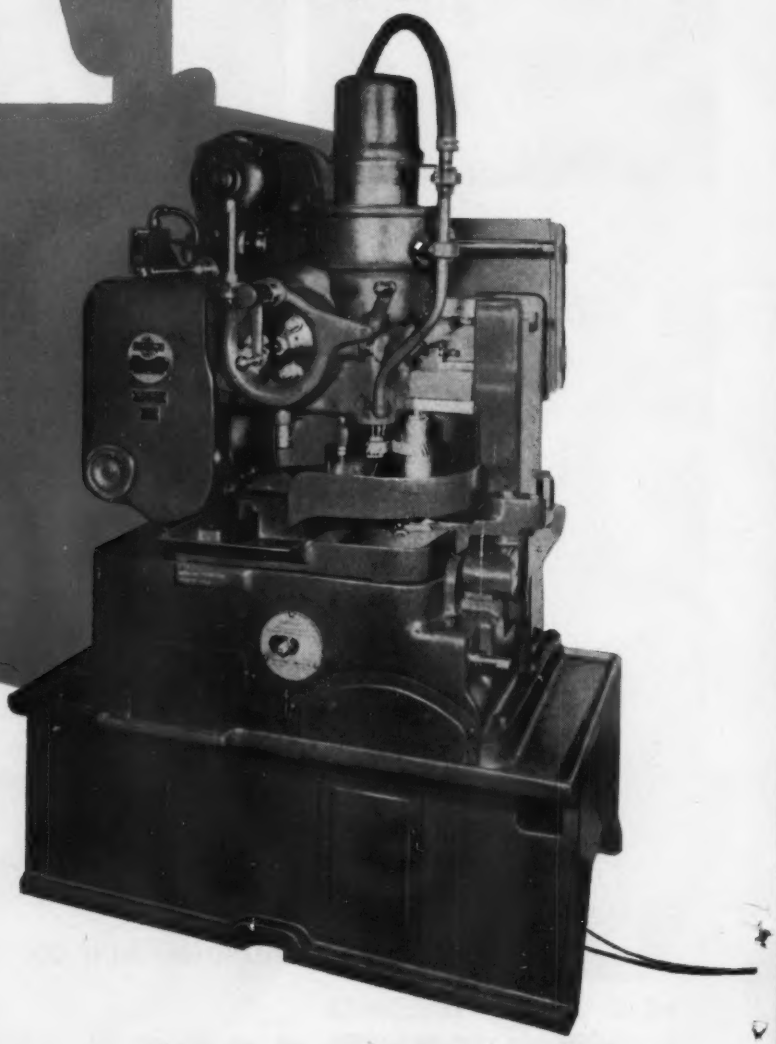
MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

FELLOWS 7A-TYPE GEAR

7A *Approved*



CALL IN a Fellows Representative for complete information about the Fellows "line-up" ... as well as facts about the Fellows Plan for deferred payment. WRITE, WIRE or PHONE any Fellows Office!

THE *Fellows*

SHAPER . . .

by Gear Men for 1955

Dollar for dollar, pound for pound . . . the Fellows No. 7125A Gear Shaper has long proved a sound investment for *any* shop that requires high-speed gear production within its size capacity. This machine scores high on all counts:

VERSATILITY . . . produces spur and helical external gears up to 7″ pitch diameter, 2″ face width . . . internals up to 6″ p.d. . . . medium coarse or fine pitch . . . cams, ratchet teeth, segment gears, face gears by using a special attachment, interrupted profiles and other special contours. ✓

SPEED . . . has earned an outstanding reputation for cutting down production costs on both long and short runs . . . can be fitted into new concepts of high-speed automation. ✓

PRECISION . . . features rugged construction to assure close tolerances even while taking substantial cuts . . . provides the kind of precision for which the Fellows Method is famous throughout industry. ✓

FAST SET-UP . . . and rapid change-over allows you to get more production. Especially advantageous for shops handling short runs. ✓

DEPENDABILITY . . . like *all* Fellows Gear Shapers . . . the No. 7125A assures an extraordinarily high level of performance on job after job . . . month after month. ✓

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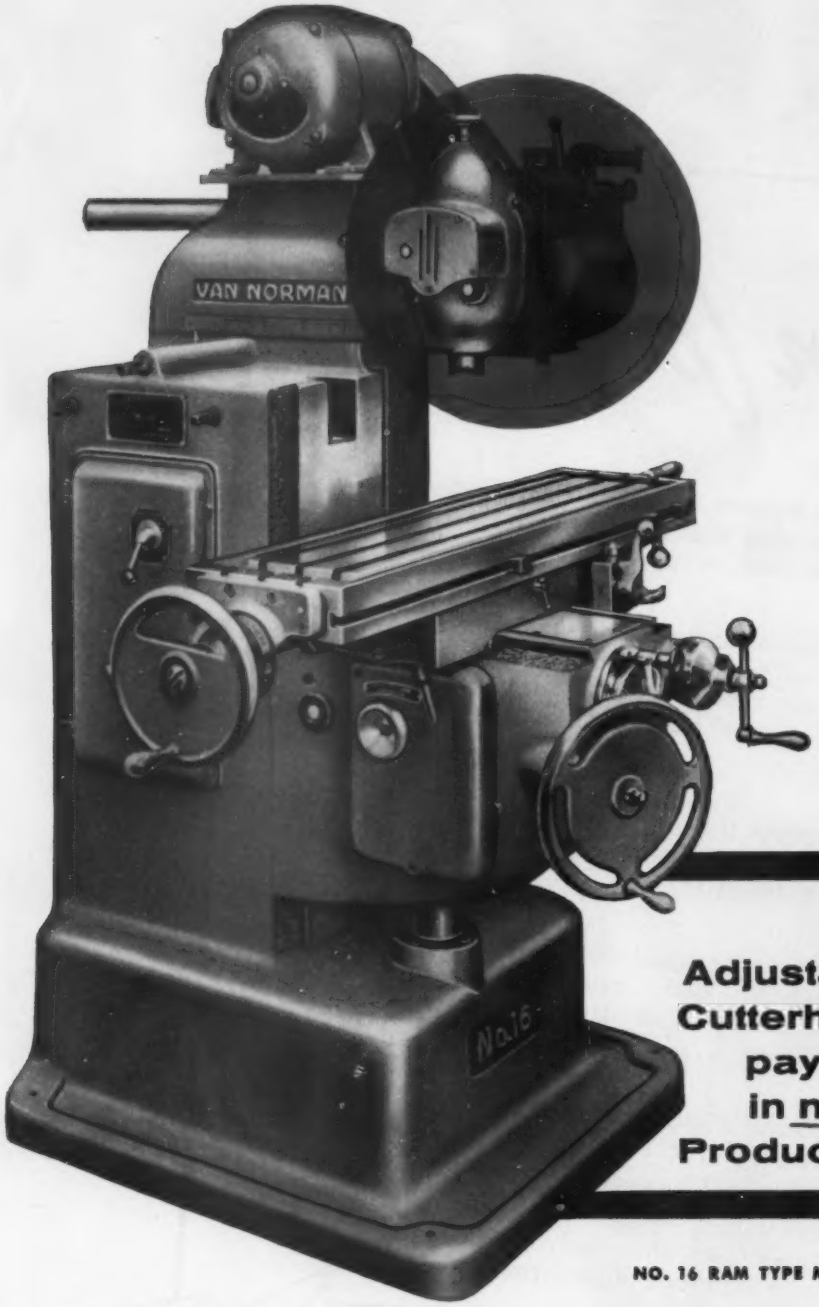
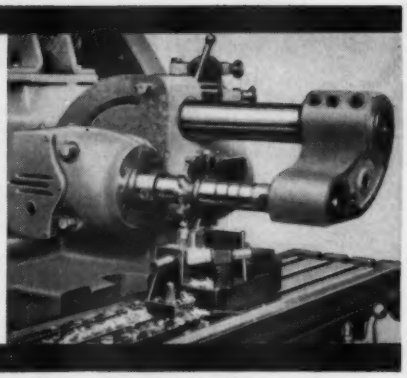


ONE does single

The Adjustable Cutterhead pays off in more Production



NO. 16 RAM TYPE MILLER

HORIZONTAL MILLING

Operator simply swivels the adjustable cutterhead to horizontal position . . . locks it in place . . . and he is ready for horizontal milling. Hardened stop set at factory assures positive 0° setting.

Conventional horizontal and verticai, as well as angular milling all on ONE miller . . . that's what you get with Van Norman Ram Type Milling Machines. The adjustable cutterhead, mounted on a movable ram, enables you to perform all types of milling by simply positioning the cutterhead in the desired position. Not only does this important feature give you the workability of several single machines, but it also minimizes work set-ups . . . cuts idle machine and operator time by permitting you to meet job to job milling requirements as they occur.

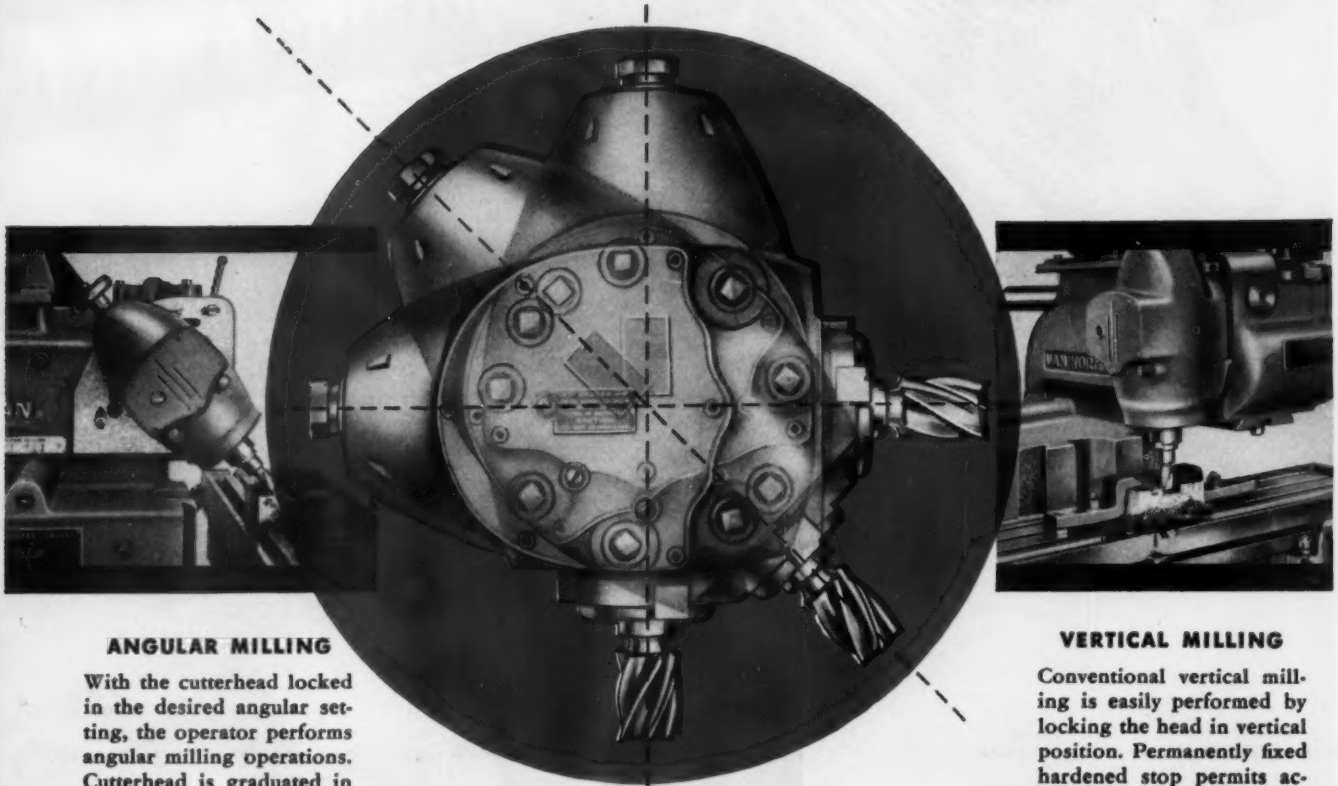
Write for full details today.

VAN NORMAN

MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

Van Norman Ram Type Miller

the work of THREE purpose machines



ANGULAR MILLING

With the cutterhead locked in the desired angular setting, the operator performs angular milling operations. Cutterhead is graduated in degrees from 0° to 90° for easy positioning.

VERTICAL MILLING

Conventional vertical milling is easily performed by locking the head in vertical position. Permanently fixed hardened stop permits accurate setting of cutterhead at 90°.

COMPANY

SPRINGFIELD 7, MASSACHUSETTS

Don't wait . . . for extra profits install a Van Norman Machine now! They are available on five purchase plans — Outright sale . . . Purchase on conditional sales contract up to 5 years . . . Pay as you depreciate . . . Straight lease . . . Lease with option to buy. See your dealer or write Van Norman Company.

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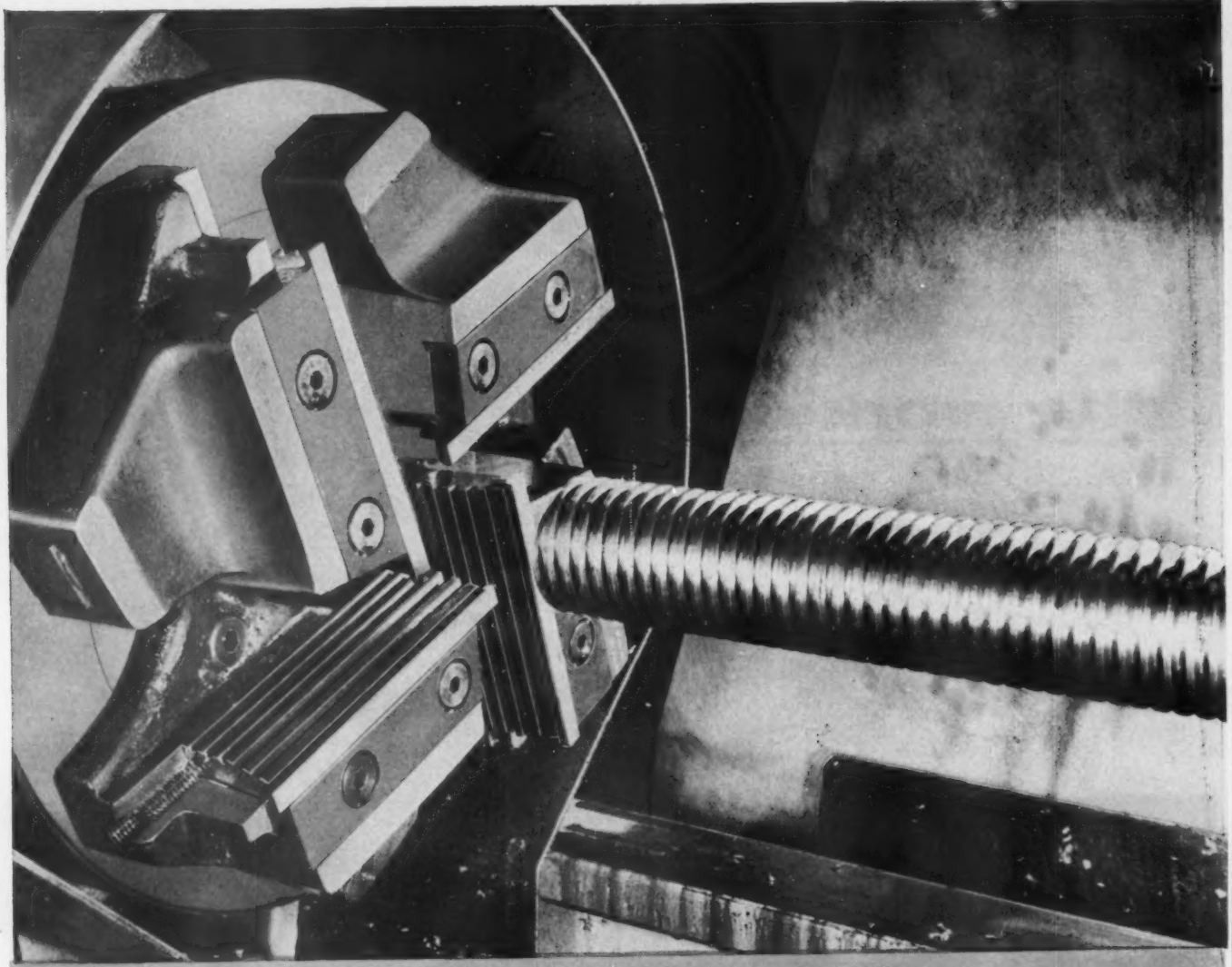
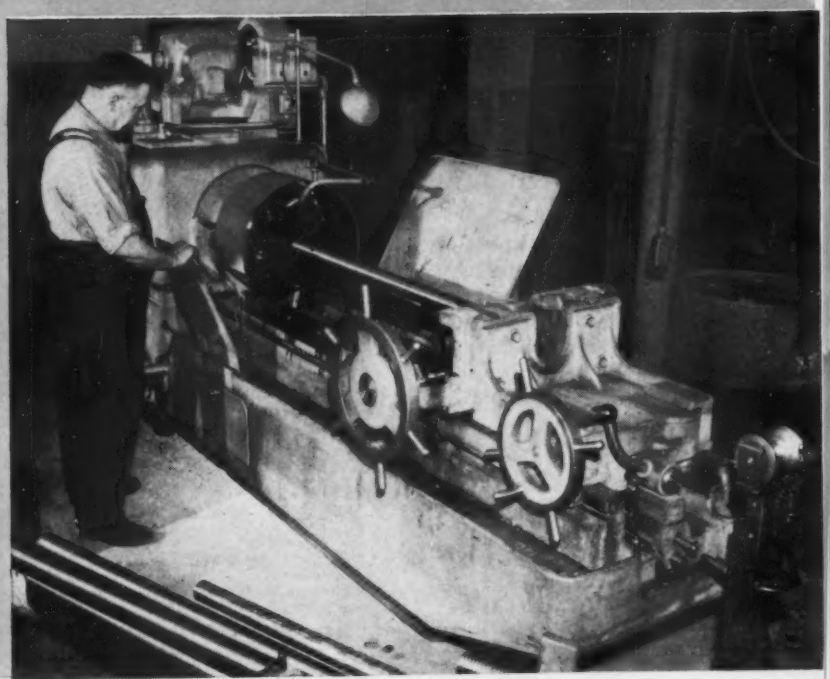




90%

threading time saved

on power screws

This large saving in the production of power screws at Rodney Hunt Machine Co. (Orange, Mass.) was made possible by the use of a LANDMACO Threading Machine.

Specifications require 2¾" diameter—2½ pitch Acme threads 56" long on cold-rolled steel. 5 hours had previously been required to complete the thread. Floor-to-floor threading time was cut to only 30 minutes after the installation of a LANDMACO 32C Single-Spindle Machine with a special 60" carriage travel.

Many features in the design of this equipment make it possible to do heavy duty threading to precision tolerances. Heavy construction and leadscrew feed assure accurate threading. Slippage of the work is prevented by an improved carriage front with 60% greater gripping power.

Massive construction of the 4" LANCO head and chaser-holders give maximum support to the chasers for the largest or smallest diameters. The tangential design of the chasers provides lateral absorption of cutting strains and free cutting action. Their roughing-and-finishing form assures threads of excellent finish in one pass, and the centering throats eliminate the out-of-roundness common in long workpieces.

This is but one example of the production economies to be derived from using LANDIS Equipment on large diameter threading. For additional information, please send specifications and ask for Bulletin #*H-45*.

The World's

Largest Manufacturer of Threading Equipment - Cutting - Tapping - Grinding - Rolling

LANDIS *Machine* COMPANY

411-C WAYNESBORO • PENNSYLVANIA • U. S. A.

4 Grinding Operations

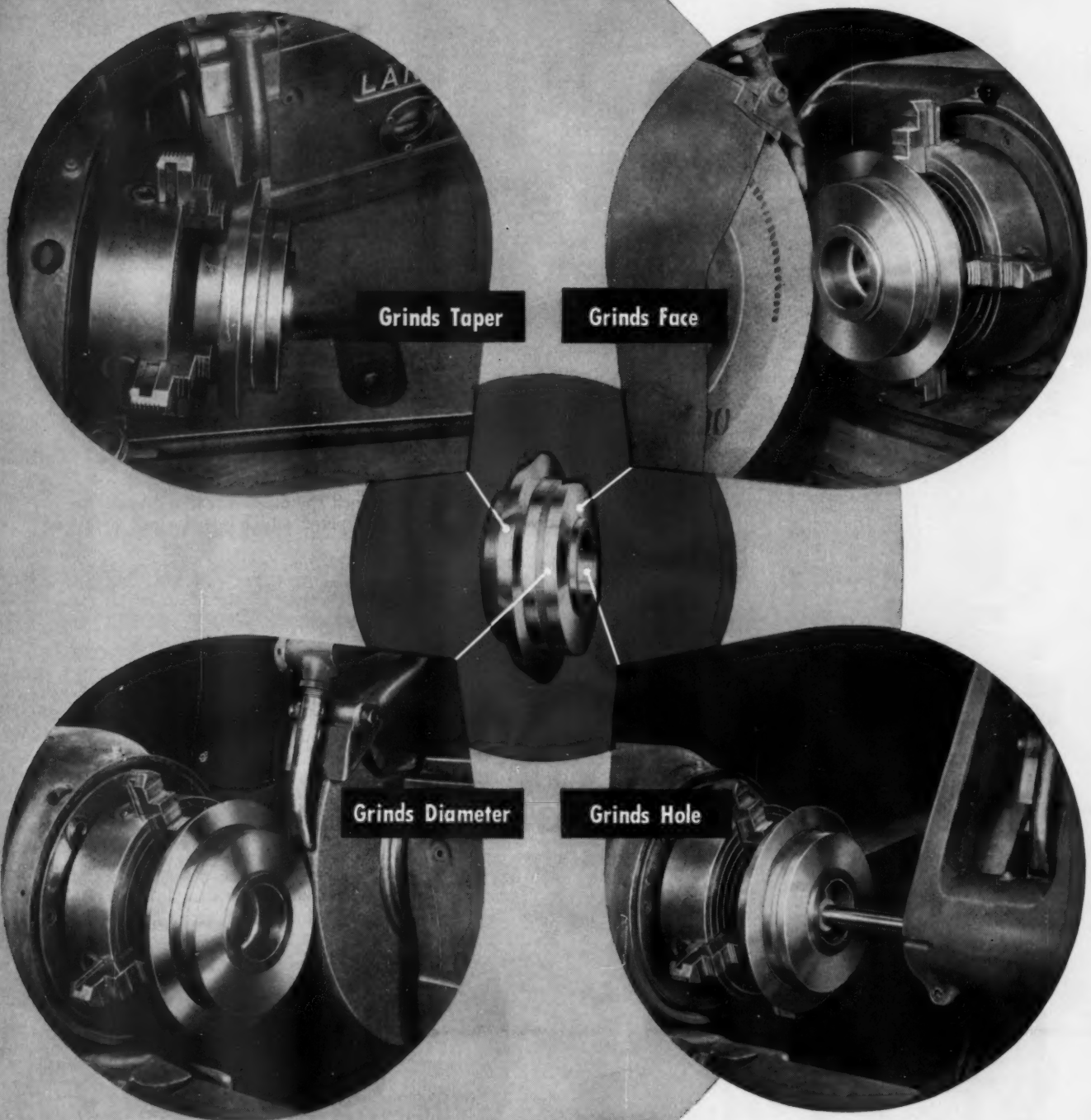
Versatility . . . an investment-saving advantage of Landis Universal Cylindrical Grinders

12" x 36" Landis Universal with swinging internal fixture and hydraulic rapid wheel head positioning.

LANDIS

precision grinders

in One Chucking



178

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

More optional arrangements give

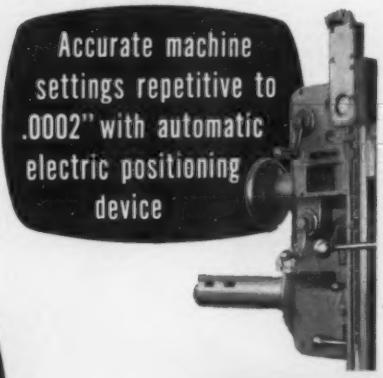
with G & L versatile 30 Series Horizontal Boring,

For accommodating large, heavy workpieces, various sizes of machine tables are available. Tables are rigidly supported on extended saddles (110" to 170") with saddle supports. This method of supporting the table provides extra rigidity . . . takes the guess work out of precision machining. What's more, it permits operator to move around the machine and the work without impeding his movements.

Model 340-T is equipped with 4-inch spindle and powered by 20 hp motor. Heavy-duty bearing design permits high speed range of 10 to 1300 rpm with 45 speed changes.

Bed Lengths — 72" to 120"; Table Sizes — from 36" to 60" widths up to 132" long with several intermediate sizes, and with 60" to 120" cross travel with saddle supports; Column Heights — 36" to 60". Also a full line of attachments and accessories are available for capacities over and above the usual run of the work.

Giddings & Lewis' versatile built-in power rotary tables eliminate locating and resetting of unusual workpieces which consume the greater portion of floor-to-floor time. They're available with ½ degree graduation and 90 degree adjustable cam type index stops. Eighteen power feeds may be engaged. Table can be rotated for accurate indexing to .001" at any angle.



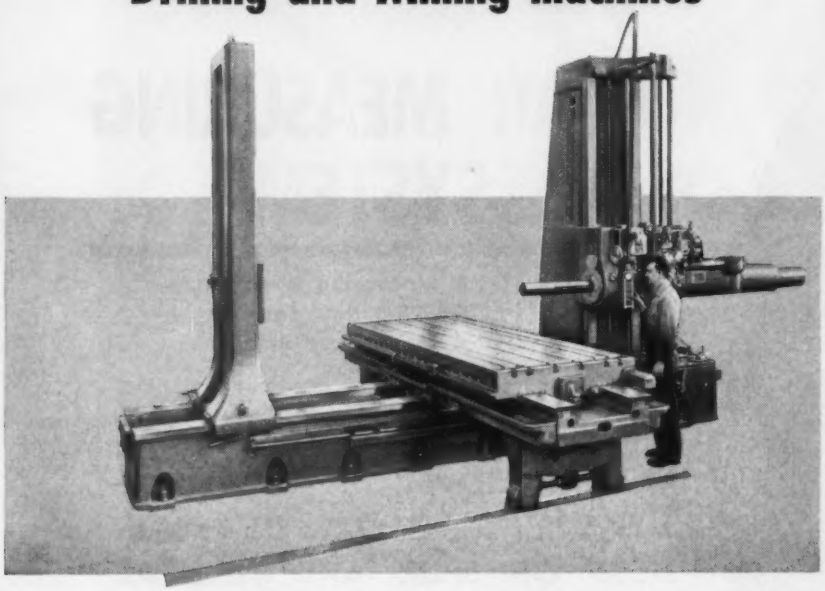
Electrically operated positioning device for both headstock and table travel is available on all G&L table machines with a 3, 4, or 5-inch diameter spindle. With it you eliminate time-consuming fine hand adjustments, work layout and inaccurate settings. It makes possible positive machine settings for precision boring operations repetitive to .0002", each mechanically controlled to pre-determined setting. It accurately selects, maintains and controls distances between machined holes.

One of the important features of G&L machines is the built-in precision thread lead device. With it you can cut precision threads to any standard prescribed form, pitch and depth. A precision lead screw, attached to the ram, operates through pick-off gears which are available in various sizes.

Forms requiring intricate contouring and profiling, both internal and external, are machined rapidly and to close accuracy with Giddings & Lewis electronic Dupli-Tracer. The unit operates on a *selective dual system* — providing simultaneous control of the saddle and headstock, or saddle and table for contour milling work — or alternately the table and headstock may be automatically controlled to give 360 degree profiling. Dupli-Tracer is available for table and floor type machines.

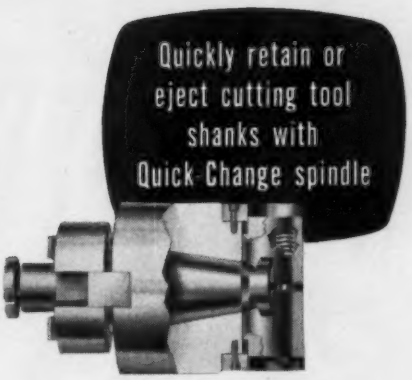
you *More Profit Opportunities*

Drilling and Milling machines

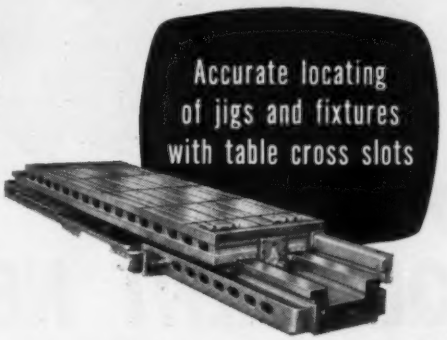


Model 350-T is the same basic design as the 340-T except that it's a proportionately heavier machine. It's equipped with a 5-inch spindle and powered by a 25 hp, 1800 rpm motor. Bearing design permits high speed operation and a speed range of 7.5 to 975 rpm with 45 speed changes.

Bed Lengths — 96" to 144"; Table Sizes — from 48" to 60" widths up to 132" long with several intermediate sizes, and with 60" to 120" cross travel and saddle supports; Column Heights — 48" to 72". Additional equipment, attachments and accessories are also available to increase working capacity.



New machine accuracy is always maintained with a G&L Quick Change spindle. You eliminate hammering to free shanks of cutting tools and prevent marring, distortion and expansion to spindle. It's optional at no extra cost instead of the Morse Taper spindle. When ordering specify Quick Change spindle.



Precision table cross slots, machined at the factory, are recommended for greater rigidity and clamping of large workpieces. Cross slots assure positive alignment for locating jigs and various types of fixtures.

Giddings & Lewis Horizontal Boring, Drilling and Milling machines, table and floor types, give you a wider range of working capacities. They assure you greater profits than any other machine tools of their type and size. When you stop to consider the variety of operations possible, you'll understand why these machines are the most versatile and your best buy.

Models 340-T and 350-T, illustrated here, can be equipped with an extremely wide line of optional equipment and accessories, providing unlimited machining opportunities. For example, you can get power-driven rotary tables, extended saddles, precision thread lead unit, automatic electric positioning device, electronic Dupli-Tracer control head, Quick Change spindle, etc. With them, you're able to perform more machining operations and do them in less time... obtain better finishes... hold close tolerances and reduce setup time to a minimum.

Compare these G&L's, and you won't buy any other machine. For complete specifications, see our nearest representative, or write direct.

Write for Literature . . .
For complete specifications on Giddings & Lewis 3, 4 and 5" spindle table type machines, ask for catalog No. 30-T and No. 300-T.

GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

THE Van Keuren GEAR MEASURING SYSTEM

Set 26EX—Gear Measuring Wires, accurate to ± .000025", for common diametral pitch external spur gears.

VAN KEUREN GEAR MEASURING WIRES PROVIDE THE MOST ACCURATE AND LOW COST METHOD OF MEASURING THE TOOTH THICKNESS OF SPUR AND HELICAL GEARS, INVOLUTE SPLINES AND INVOLUTE SERRATIONS.

ONLY... EQUIPMENT NEEDED:

1—SET VK MEASURING WIRES
1—MEASURING INSTRUMENT

Complete information regarding the use of Gear Measuring Wires is contained in a 50-page section of the Van Keuren CATALOG and HANDBOOK No. 35. Included in this section are:

- **. . . table of wire sizes for the 1.92", 1.728", 1.68" and 1.44" series.**
- **. . . tables of wire measurement including change factors for standard external and internal spur gears of 14½°, 17½°, 20°, 25°, and 30° pressure angles and of from 5 to 500 teeth.**
- **. . . table of relationships between depth of cut and tooth thickness for common pressure angle gears.**
- **. . . definitions and exact formulas covering involute spur gears.**
- **. . . tables of involute tooth parts for standard addendum and stub tooth involute gears.**
- **. . . information, formulas and examples regarding the wire measurement of helical gears.**
- **. . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.**
- **. . . tables of wire measurement for involute splines.**
- **. . . tables of wire measurement for involute serrations.**
- **. . . tables of comparative measurement over three sizes of wires for use in involute profile checking.**

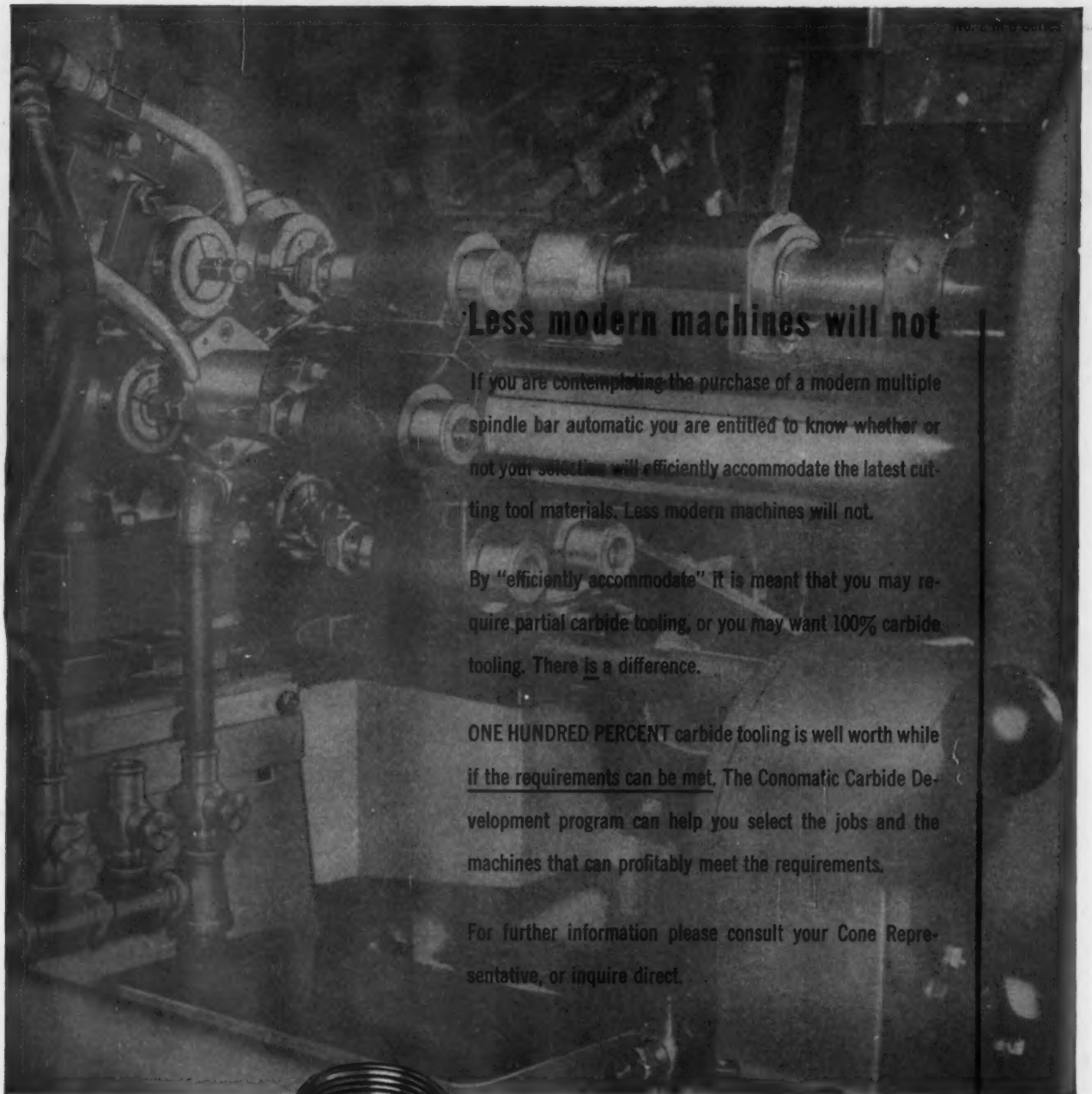
CATALOG and HANDBOOK No. 35 is available without charge by writing to:
The Van Keuren Co., 173 Waltham St., Watertown, Mass. Ask for your copy.

VK
36th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages



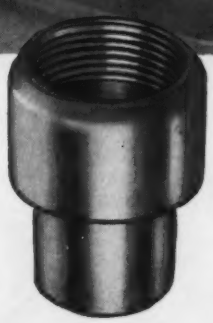
Less modern machines will not

If you are contemplating the purchase of a modern multiple spindle bar automatic you are entitled to know whether or not your selection will efficiently accommodate the latest cutting tool materials. Less modern machines will not.

By "efficiently accommodate" it is meant that you may require partial carbide tooling, or you may want 100% carbide tooling. There is a difference.

ONE HUNDRED PERCENT carbide tooling is well worth while if the requirements can be met. The Conomatic Carbide Development program can help you select the jobs and the machines that can profitably meet the requirements.

For further information please consult your Cone Representative, or inquire direct.



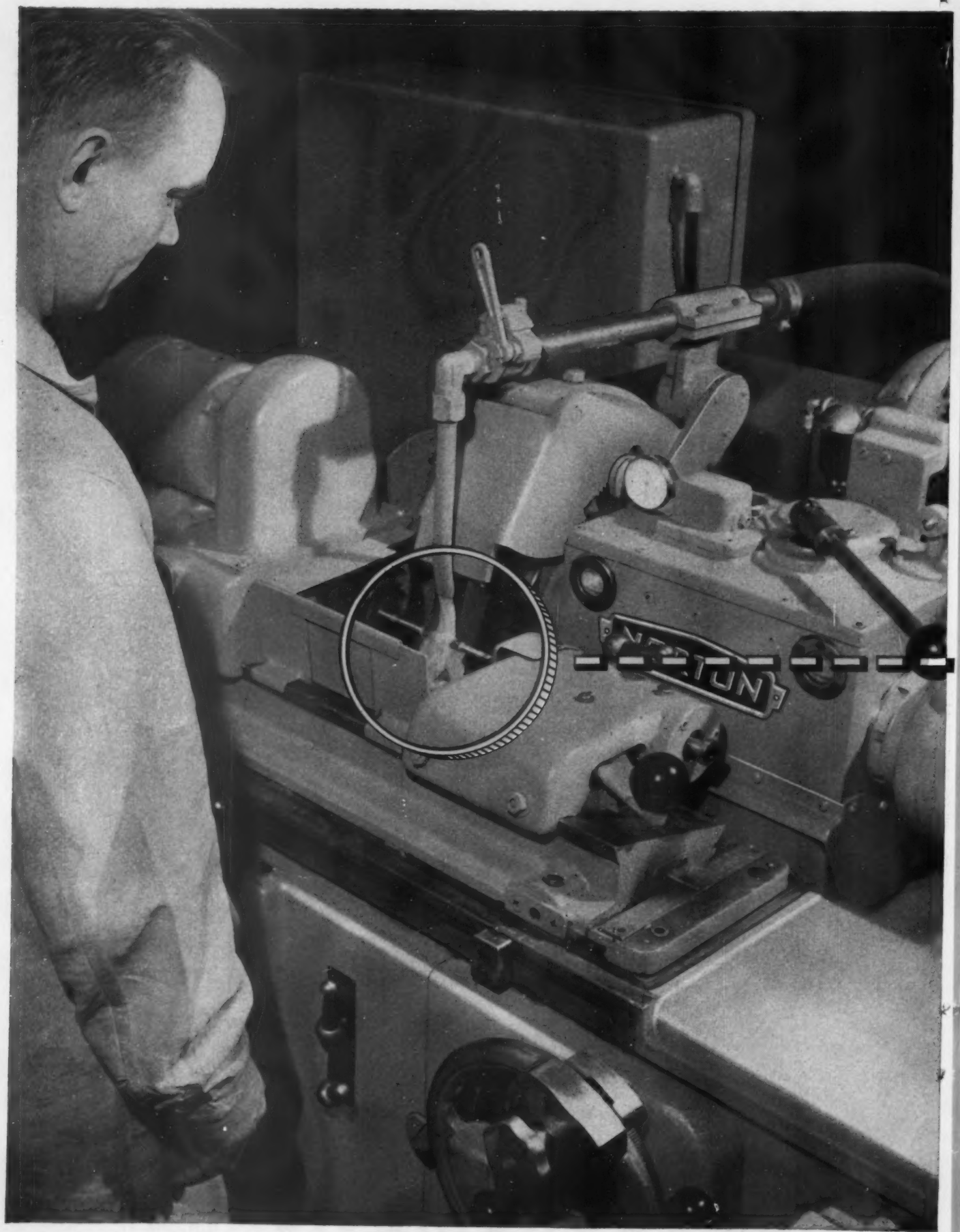
MATERIAL—1040 STEEL

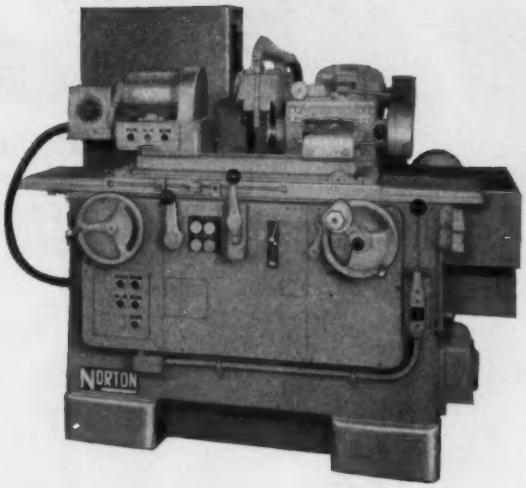
	HSS	CARBIDE
Cycle Time	*	30 secs.
Work Spindle Speed	*	670 R.P.M. at 160 S.F.
Tool Wear	*	2000 pcs. per grind

*Hot rolled material prevents fair comparison

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.





New Norton 4"x18" Type CTU Cylindrical Grinder

gives you high precision plus high production . . .

makes small parts pay off big

Here's a cylindrical grinder you can get as either a Plain Machine for traverse work, or as a Semiautomatic for plunge operations.

Either way you get faster, more accurate, more profitable grinding of a wide variety of small parts. Because either way the 4" Type CTU's Norton-developed features bring a new ease of operation for your men — and a new high in production quality and quantity for *you*.

To name just one of these advanced features, there's the extremely rugged wheel spindle unit that assures enduring precision in jobs ranging from heavy stock removal to fine finishing. But why not get the whole story of this speedy, profit-boosting grinder from your Norton Representative?

Write for Catalog No. 531. And remember: only Norton offers you such long experience in both grinding wheels and machines — to help you produce better products at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

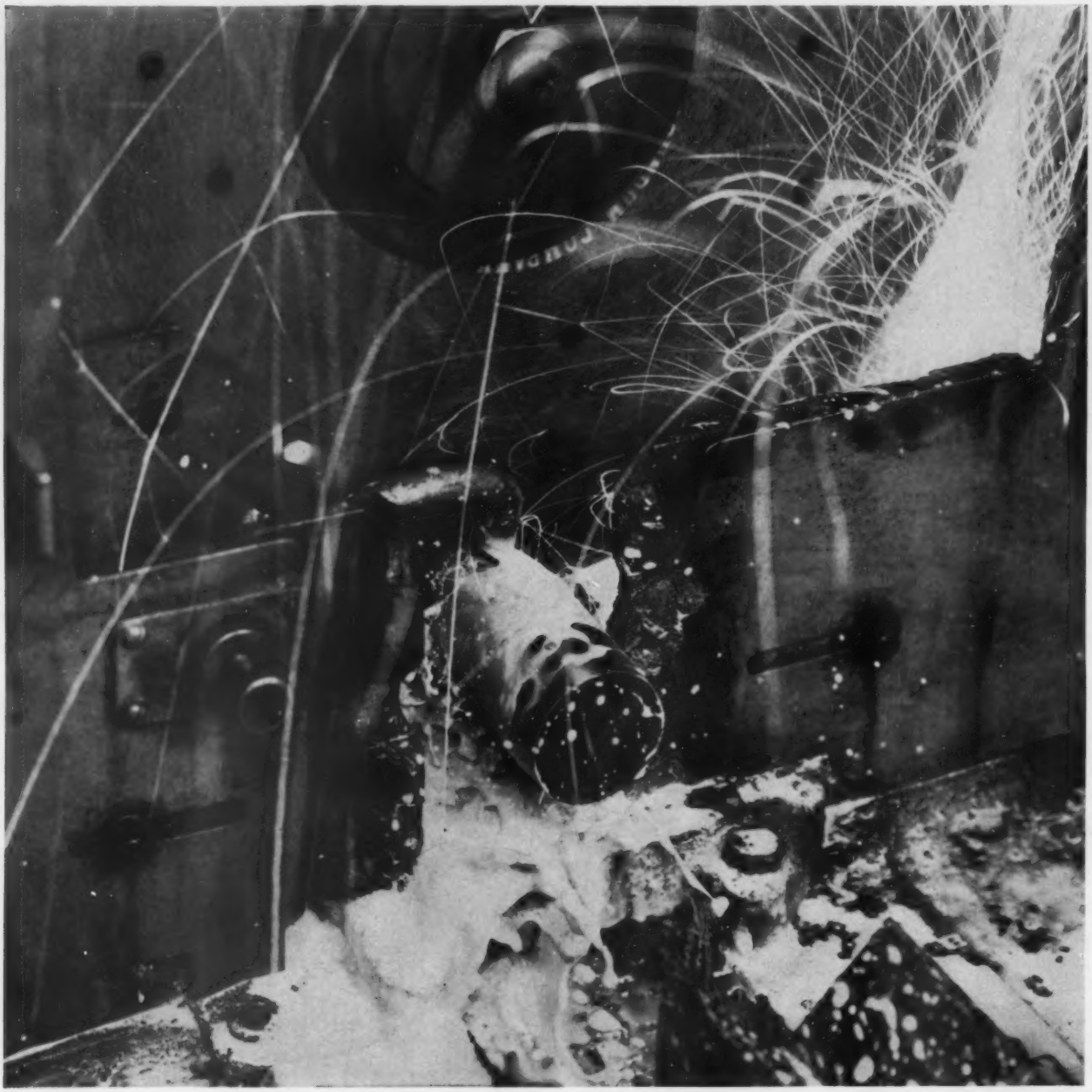
***To Economize, Modernize With* NEW**

NORTON

GRINDERS *and* LAPPERS

Making better products . . . to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit • *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5, Ontario



Wheel guard removed to reveal cutting action.

SLICE THROUGH METAL...12 times faster

RUBBER BOND For wet cutting-off, with smooth, clean cuts free from burr or discoloration. Tolerances can be held within thousandths.

RESINOID BOND For dry cutting at high speeds. Rigid scientific controls during wheel manufacture insure perfect balance, running truth and straightness.

"CARBOFLEX" FIBRE-REINFORCED BOND For portable cutting and slotting, where severe side pressure and heat shock is encountered. Resilient construction gives cushion-like action and maximum safety.

FREE BOOKLET ON METALLIC CUTTING-OFF! Write to The Carborundum Company, Dept. AM 81-52, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ont.

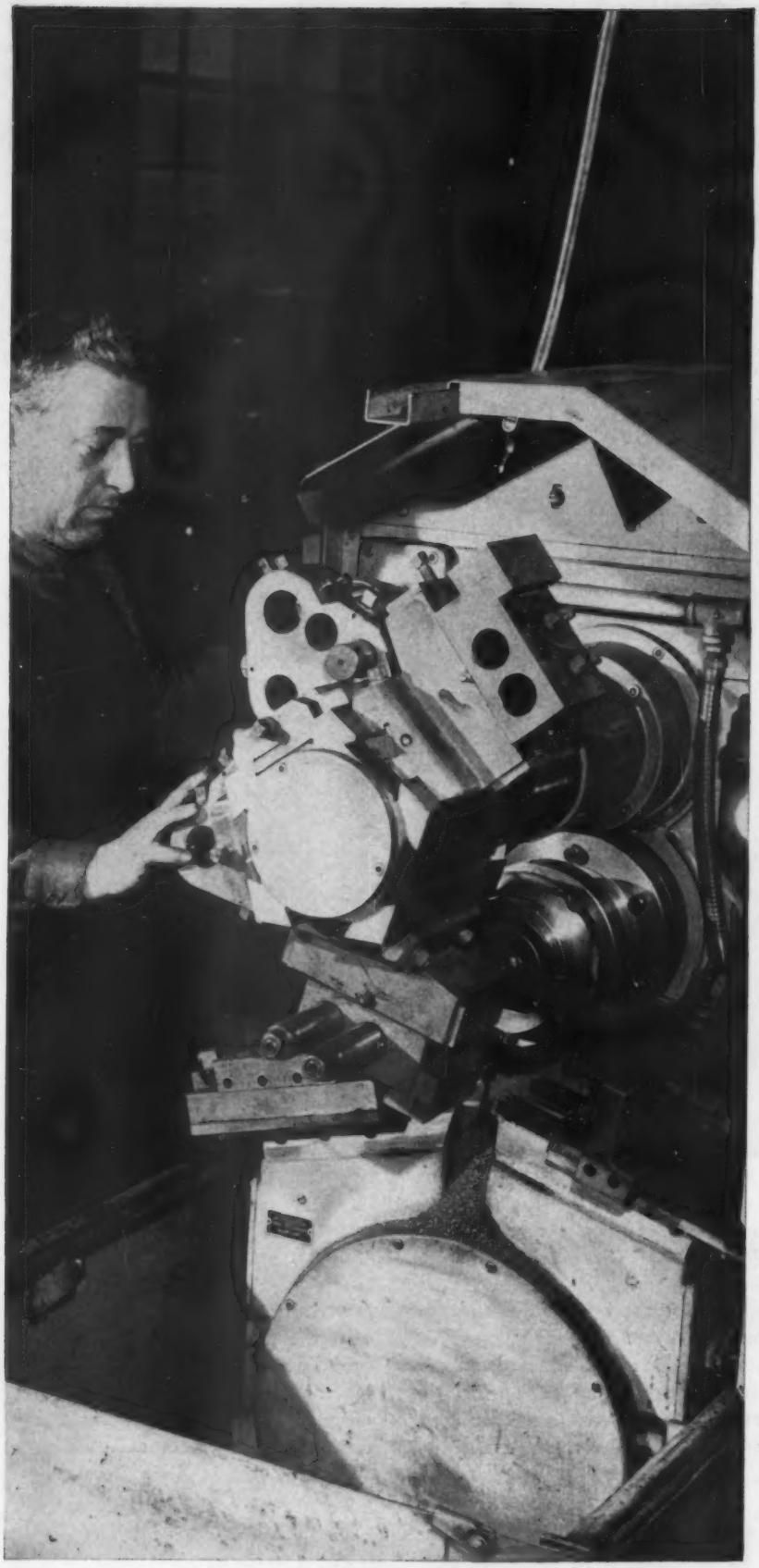
THE MAN TO SEE IS YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN He's listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels." Call him today—he'll show you how abrasive cut-off wheels by CARBORUNDUM can give you more production at lower cost, whether you're slitting fountain-pen points or cutting heavy castings. He's ready to work with you on any cutting, grinding or finishing problem.

...with abrasive **CUT-OFF WHEELS**

Metallic cutting-off on a production basis, to extremely close tolerances...as well as accurate off-hand cutting with portable equipment, is possible *only* with abrasive cut-off wheels. CARBORUNDUM has developed precision cutting-off wheels for every operation and every kind of metal...ferrous or non-ferrous, annealed or unannealed...rod and stock, thin or heavy-walled tubing, or sheet. **THE RIGHT WHEEL** on the correct machine will cut twelve or twenty times *faster* than power hacksaws. And you eliminate the extra grinding and finishing operations usually required after shearing or flame-cutting. Bring *your* cutting-off operations up to date—use abrasive cut-off wheels by CARBORUNDUM.

CARBORUNDUM
REGISTERED TRADE MARK

...continually putting more **SENSE** *in your abrasive* **DOLLAR**



When Precision was the Pay-Off!

HALEY MACHINE COMPANY, Springfield, Ohio, installed a Warner & Swasey 1 AC Single Spindle Automatic Chucking Machine to turn vital, high-precision hydraulic pump parts for U.S. Army tanks. The job called for extreme accuracy, because these pumps are filled under pressure with an exceptionally light oil.

To avoid leakage these extremely close tolerances had to be held—40 to 63 micro-inch finish on surface finishes, .002" on forming, .0008" to .001" on turning, and .001" in concentricity. Maintaining such accuracy with previous methods was difficult—scrap loss was too high. Production had to be speeded up.

Boosts Production, Cuts Scrap Loss

The new Warner & Swasey took the function of holding these close tolerances out of the operator's hands—substituting the automatic operation of this high-precision machine for

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &

the job. Production was doubled—in some cases tripled! Scrap loss was reduced 12 to 15%.

This type of consistent accuracy is just not possible by manual methods due to the human error of even the best machinists. It is even unusual for an automatic. But the Warner & Swasey 1 AC has the rigidity, the *built-in* accuracy, plus the ability to repeat accurate settings to handle the *most difficult* jobs!

But extreme accuracy is just one important advantage offered by Warner & Swasey Single Spindle Automatics. Both the 1 AC and 2 AC are *real producers!* As at Haley Machine Company, their fast, automatic operation has paid off in plant after plant—where production had to be increased in existing floor space, or where production "bottlenecks" had to be broken to meet production schedules.

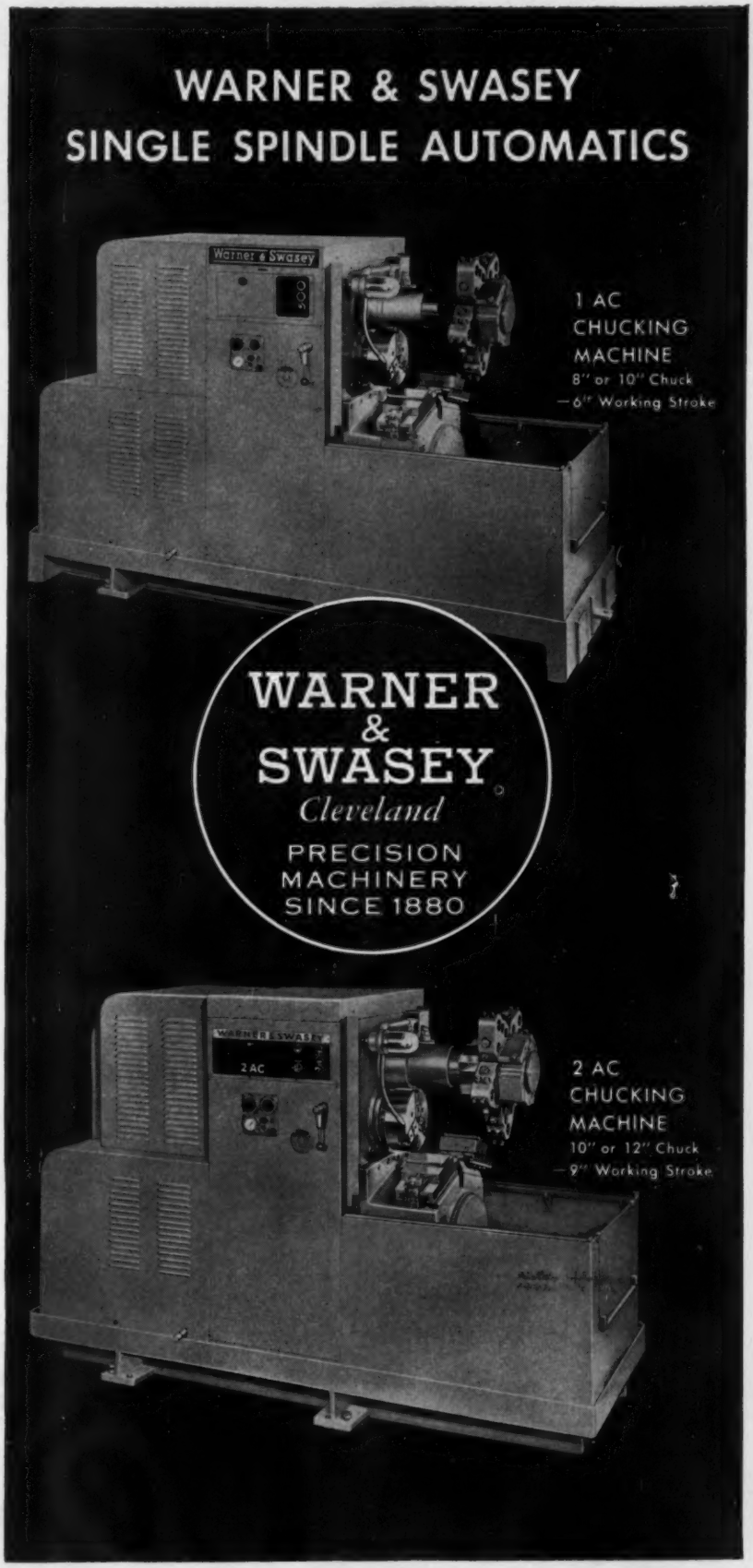
Quick Setup Provides Flexibility

The fast, easy setup of these machines extends the advantages of automatic operation to *small-lot* work as well as medium and longer run jobs. Each has a pentagonal control drum equipped with easily adjustable trips for selection of feeds, spindle speeds, length of cutting stroke, and skip indexing. No cam changes are needed.

Operators like these Automatics' ease of operation—and accuracy and production can be maintained by operators with less skill than that required for hand-operated machines.

See Your Turning Specialist

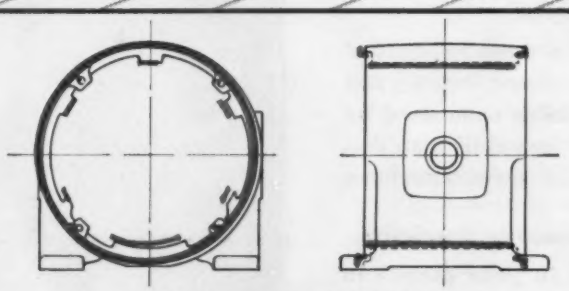
Certain jobs in your plant can undoubtedly be machined better, faster, and more profitably with Warner & Swasey Single Spindle Automatics. Call in your *turning specialist*—your Warner & Swasey Field Representative—and have him show you how these machines can cut costs and *build profits* for you!



SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

PROBLEM

1. lower stator frame machining costs.
2. increase production and accuracy
3. run any one of four different size parts



MACHINING NECESSARY

Drill 8 holes	Bore two inside diameters
Chamfer .8 holes	Rough face ends
Tap 8 holes	Remove chips

for problems in Drilling, Boring, Facing and Tapping

Call a Natco Field Engineer

CHICAGO, Room 203, 6429 W. North Ave., Oak Park
DETROIT, 10138 W. McNichols Rd. • BUFFALO, 1807 Elmwood Ave.
NEW YORK, 35 Beechwood Ave., Mount Vernon

NEW NATCO HOLEWAY

cuts costs and increases production . . . and accuracy by combining operations!

SOLUTION

ESTIMATED GROSS PRODUCTION

30 PARTS PER HOUR

(ANY ONE OF FOUR DIFFERENT SIZE PARTS)

OPERATIONS

STATION No. 1
Load 1 part.
STATION No. 2
R. H. Horizontal Head
Combination rough bore for 10.492/10.490 half thru, rough bore for 12.064/-12.062 diameter, finish bore 10.520/10.510 diameter and rough face end.
L. H. Horizontal Head
Drill 4 holes

STATION No. 3
Idle
STATION No. 4
R. H. Horizontal Head
Drill 4 holes
L. H. Horizontal Head
Combination rough bore for 10.492/10.490 diameter rough bore for 12.064/12.-062 diameter and rough face end.

STATION No. 5
Idle
STATION No. 6
R. H. Horizontal Head
Tap 4 holes
L. H. Horizontal Head
Tap 4 holes
STATION No. 7
Idle
STATION No. 8
R. H. Horizontal Head
Idle

L. H. Horizontal Head
Finish bore to 10.492/10.490 diameter thru.
STATION No. 9
Blow chips out of center bore and 8 tapped holes (4 each side) and blow chips off top.
STATION No. 10
Unload 1 part. Part to be unloaded onto gravity conveyor.

NATIONAL AUTOMATIC TOOL COMPANY, INC.

RICHMOND, INDIANA

NATCO

Presenting...

the NEW tri-D® MILLING HEAD

KEARNEY & TRECKER MILWAUKEE

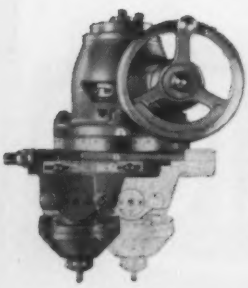
adaptable to almost all horizontal and some vertical milling machines... regardless of make

The new TRI-D Milling Head is the latest addition to Kearney & Trecker's outstanding Rotary Head milling family. TRI-D is designed for quick, easy mounting on practically all horizontal and some vertical milling machines.

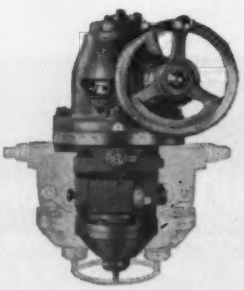
The TRI-D Milling Head can produce almost any geometric shape in metal employing straight lines, radii or angles — all in a single set-up. Power is transmitted to the spindle through a heavy-duty flexible shaft driven by the machine spindle or a separate motor equipped with variable speed pulleys.

TRI-D's matchless technical perfection brings to metal cutting an insured investment equalled by no other single element of production. Find out how you can increase production and cut milling costs with this new milling head. Your Kearney & Trecker representative will be pleased to give you all the details. Contact him today, or write Kearney & Trecker Corporation, Milwaukee 14, Wisconsin.

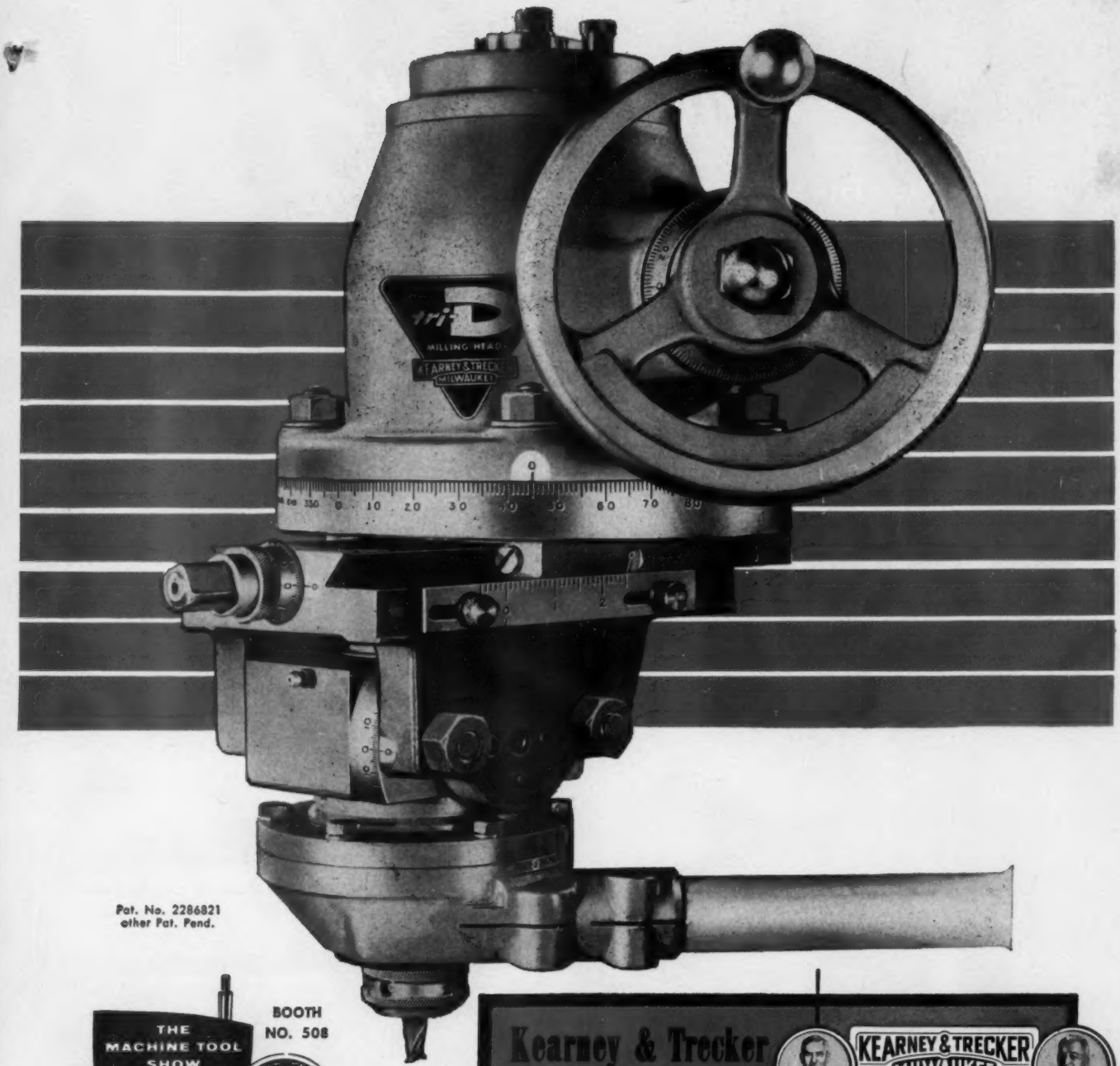
Only tri-D has all 3 . . .



1. **LATERAL ADJUSTMENT** of the cross-slide permits off-setting the spindle up to 2½". A large dial, graduated in thousandths, is mounted on the cross-slide screw. Precision-ground screw assures the ultimate in accuracy and long life. A friction-lock secures cross-slide position.



2. **ROTARY MOVEMENT** of the head through a complete circle, or any specific part, is easily accomplished by turning handwheel in either direction. Combined with lateral adjustment of the cross-slide, this rotary movement permits milling of circles up to 5" in diameter.



Pat. No. 2286821
other Pat. Pend.

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATRE

BOOTH
NO. 508

Kearney & Trecker
CORPORATION
MILWAUKEE 14, WISCONSIN

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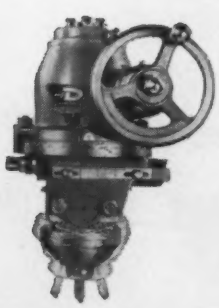
MACHINE TOOLS



3. **ANGULAR ADJUSTMENT** of cutter, an exclusive feature, is the swivel block which permits positioning of the cutter at any angle in the vertical plane, up to 15°, either side of center. Easy-to-read graduations make setting to a precise angle a very simple operation.

Kearney & Trecker Corporation
6784 W. National Avenue
Milwaukee 14, Wisconsin

Please send me catalog No. TD-10 with details on new TRI-D Milling Head.

Name.....

Title.....

Company.....

Address.....

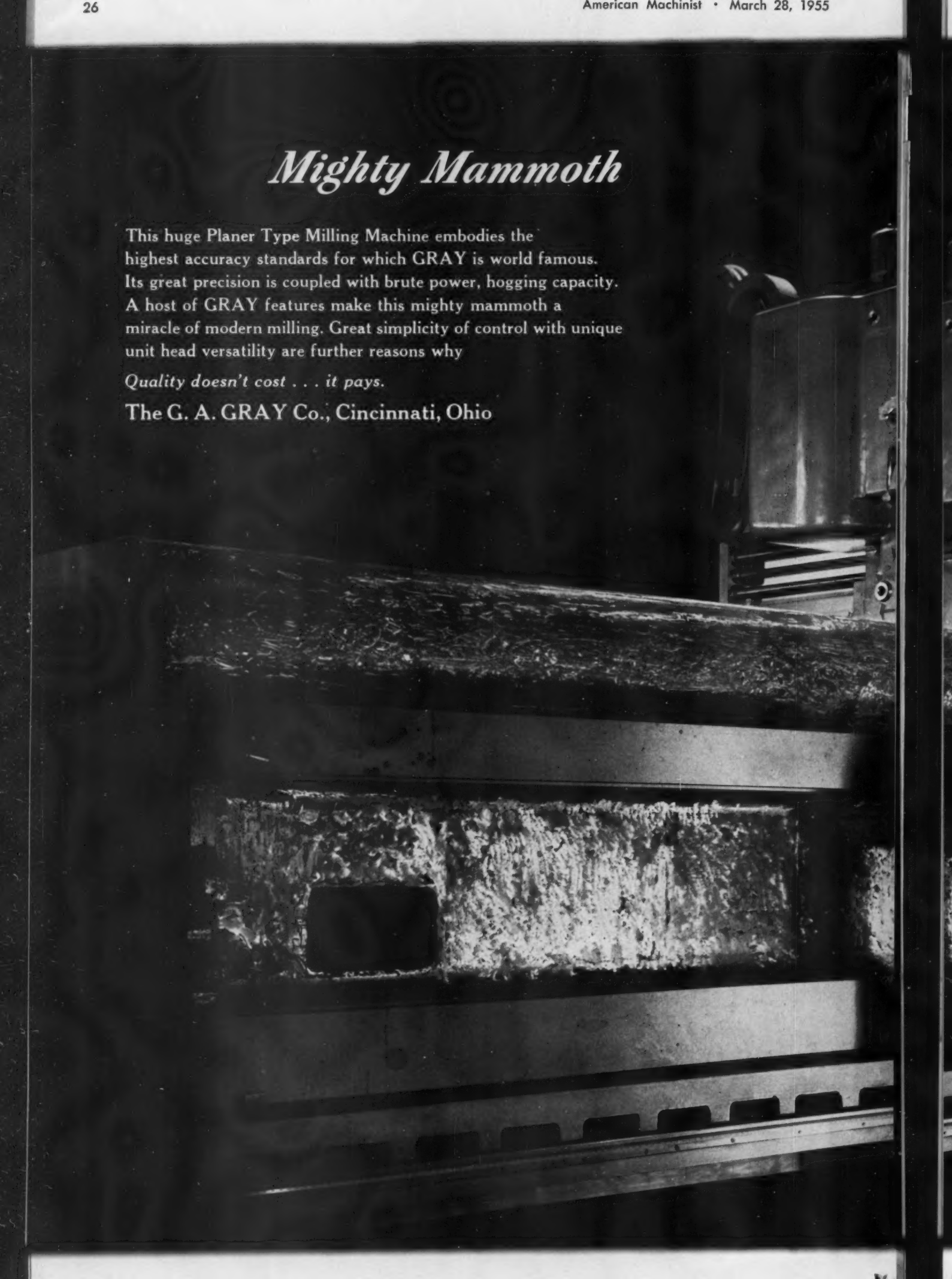
City.....Zone.....State.....

Mighty Mammoth

This huge Planer Type Milling Machine embodies the highest accuracy standards for which GRAY is world famous. Its great precision is coupled with brute power, hogging capacity. A host of GRAY features make this mighty mammoth a miracle of modern milling. Great simplicity of control with unique unit head versatility are further reasons why

Quality doesn't cost . . . it pays.

The G. A. GRAY Co., Cincinnati, Ohio



GRAY

Here's another reason it pays to get a proposal from Fosdick

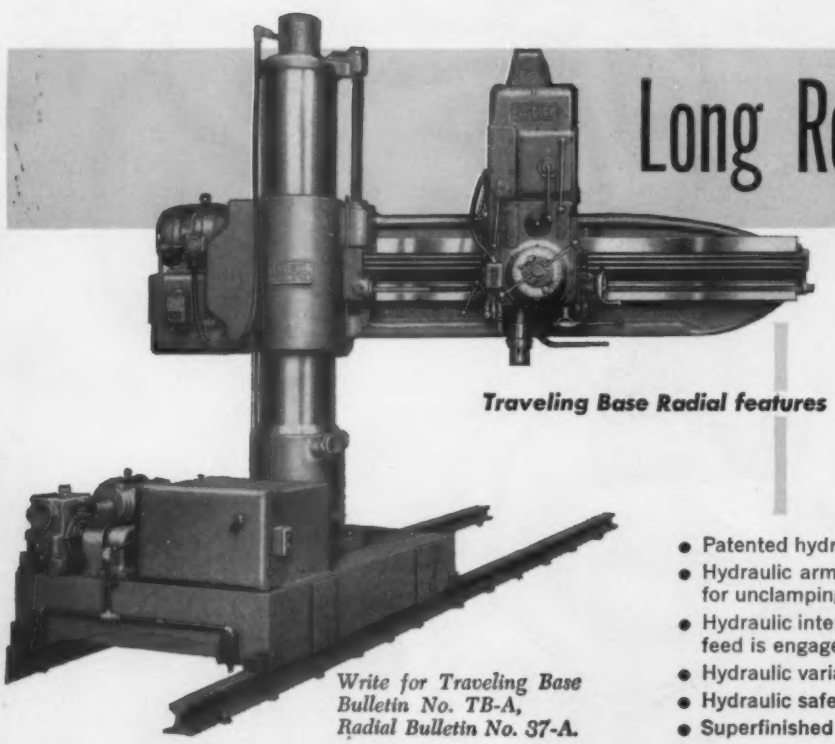
No Need to Move This 13-Ton Work Piece!

Work stays put, throughout entire drilling operation. The Fosdick Traveling Base Radial does all the moving. With its 8′ arm and 35′ track, it easily reaches every part of the heavy work piece—a 72″ x 16′ table for a Rockford Hy-draulic Planer.

The Fosdick Radial enables operator to drill hundreds of holes in one work setting. Arm can be rotated on column to reach smaller-work rush jobs on other end or other side of track, without disturbing heavy work set-up. Track clamps and hydraulic column clamp prevent side movement of column, assure accuracy and speed of drilling.

If your drilling work includes heavy pieces like the planer table shown, you can cut excessive handling time to a bare minimum with a Fosdick Traveling Base Radial. When you need drilling equipment, always be sure to get a proposal from Fosdick.

Long Reach of Fosdick



Traveling Base Radial features

Traveling base traverses by push buttons conveniently located on head.

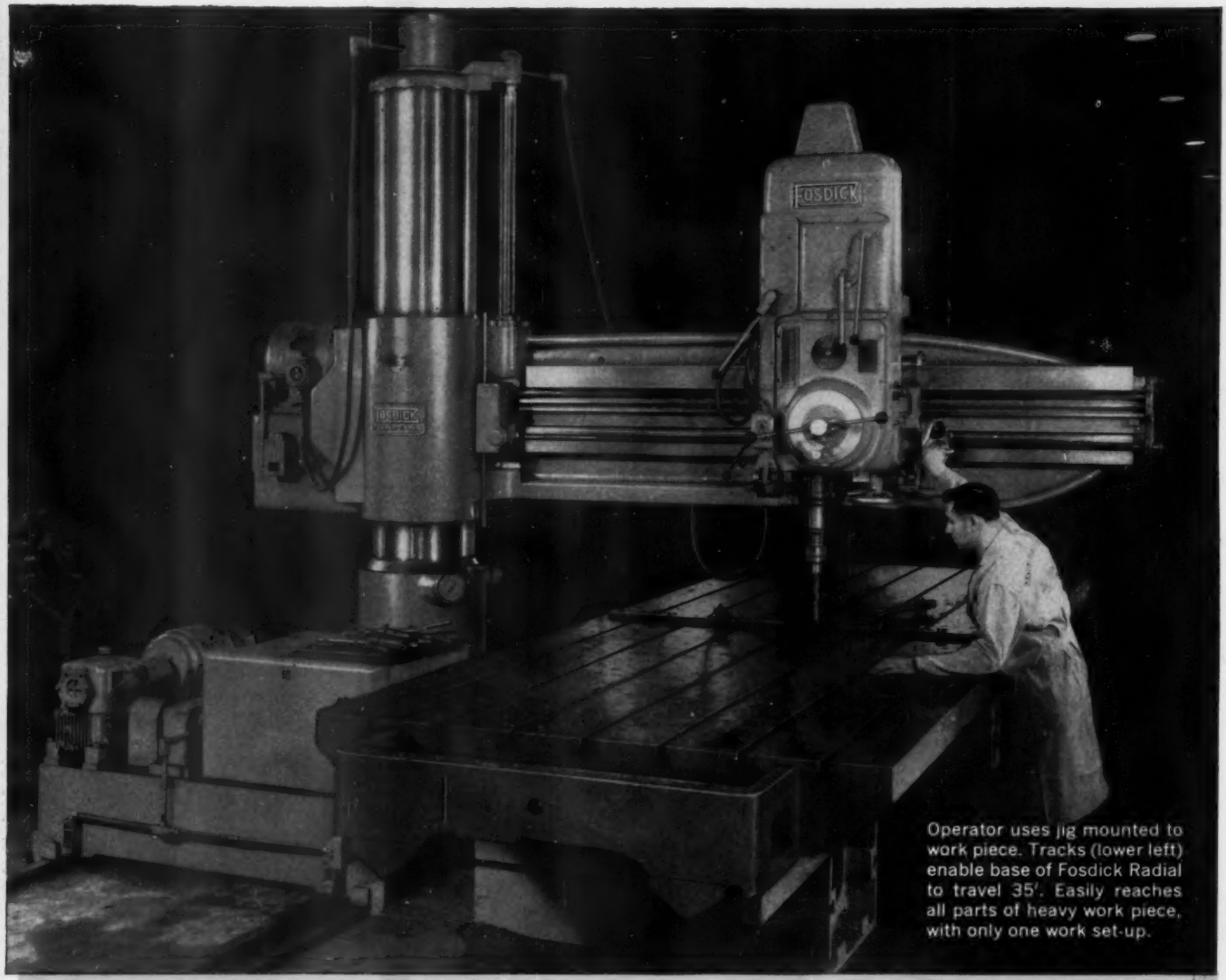
Traverse buttons also clamp and unclamp base to rails, automatically.

Hydraulic rail clamps compensate for rail irregularities.

Interlock prevents arm from swinging while base is traversing. Base is heavy cast iron, honeycombed for rigidity and stable operation.

- Patented hydraulic arm and column clamps.
- Hydraulic arm clamp interlocked with single-lever control for unclamping and raising and lowering arm.
- Hydraulic interlock clamps head and column when feed is engaged.
- Hydraulic variable rapid traverse to head.
- Hydraulic safety nut.
- Superfinished column.

Write for Traveling Base Bulletin No. TB-A, Radial Bulletin No. 37-A.



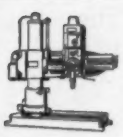
Operator uses jig mounted to work piece. Tracks (lower left) enable base of Fosdick Radial to travel 35'. Easily reaches all parts of heavy work piece, with only one work set-up.

Traveling Base Radial Cuts Handling Time

"Savings run up to 50% on jobs where handling time is a large part of total time. Fosdick performance has been excellent!"

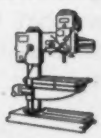
says K. M. Allen, Executive Vice President
Rockford Machine Tool Company, Rockford, Ill.

Need Drilling Equipment? Get a Proposal from Fosdick!


Radial Drills

Jig Borers

Sensitive and Upright Drills

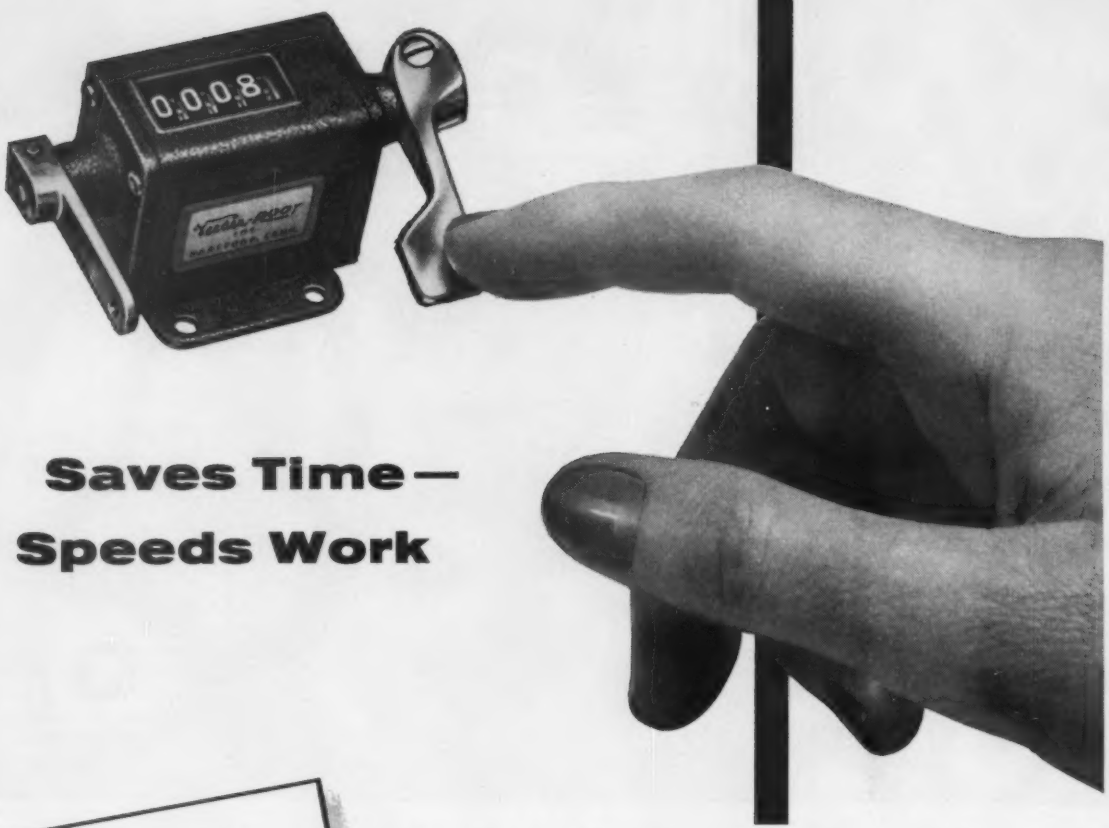

Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

Quick Lever Reset



Saves Time—Speeds Work

Added Evidence that—

Everyone Can Count on VEEDER-ROOT

Where time consumed in resetting is at a premium . . . on short machine-runs, inspection, military equipment and other applications . . . this new time-tested Quick-Reset Ratchet Counter is exactly the time-saving device you need. Just depress the easy-acting lever on the right side through 45° . . . *all 4 figures reset instantly to zeros.* And a thumb-lever may be used on the left side also if the counter is to be operated manually.

This compact, standard counter, now readily available from stock, is one of scores of Veeder-Root Counters (both standard and special) for manual, mechanical and electrical operation in every field from electronics to atomics. Just name what you want to count . . . and "The Name that Counts" will help you do the job. Write:

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"The Name that Counts"

Sales Up . . . Profits Down?

The Answer is New Methods on NEW BRITAIN

- AUTOMATIC CHUCKERS
- MULTIPLE SPINDLE BAR MACHINES
- SINGLE SPINDLE AUTOMATICS
- PRECISION BORING MACHINES
- LUCAS PRECISION HORIZONTALS
- NEW BRITAIN +GF+ COPY LATHES

See the following four pages for other New Britain New's.

The secret of precision boring is constant close control of the tool

Precision-ground cams assure accuracy of tool paths under all conditions on a New Britain Precision Boring Machine. Equally important is split-second control of cycle timing. This is accomplished by means of the program drum illustrated at the right. Cams and trip dogs accurately time all motions of the tool and the machine units. It is enclosed by a lift-off cover and is immediately accessible from the operator's side of the machine. These are important features of the New Britain approach to more profitable precision boring.

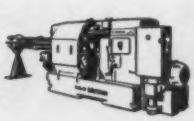
New Britain +GF+ Copying Lathe combines 2 operations in 1 pass

Yes, we taper turn the shaft end of this gear blank and copy turn the rest in the same operation — which keeps the cost of the piece down. This happens all the time on a New Britain **+GF+** copying lathe. You can spot other examples of it in the other pieces on the table.

The New Britain **+GF+** is a copy turning machine, not a lathe with an attachment. The copy slide is part of the carriage for taking heavy cuts at carbide speeds. Contoured work in small lots or on an automated basis, is accurately turned from a simple template on the front of the machine.

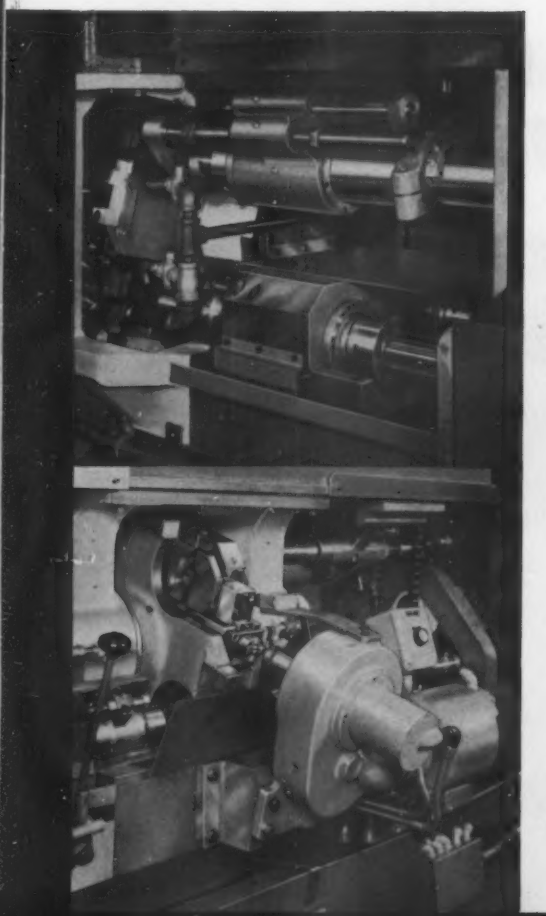
The secret of carbides on bar machines is elimination of slide deflection

Carbides won't tolerate sloppy feeds. Positive slide actuation on a Model 601 New Britain Automatic results from mounting the cams directly behind the slides. A plus benefit is that cross slide feed changeovers can be made in minutes with these pick-off cams.



See the preceding two pages and the two following for other New Britain *New's*.

Six-spindle production in "Three-spindle" time



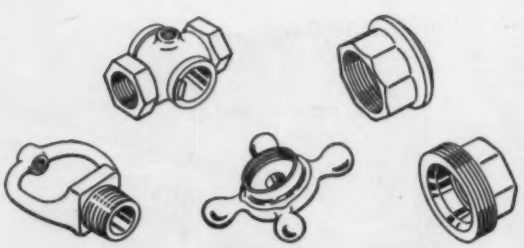
View of the rear side of the machine with the guards removed, showing the two lower spindles and the upper threading spindle.

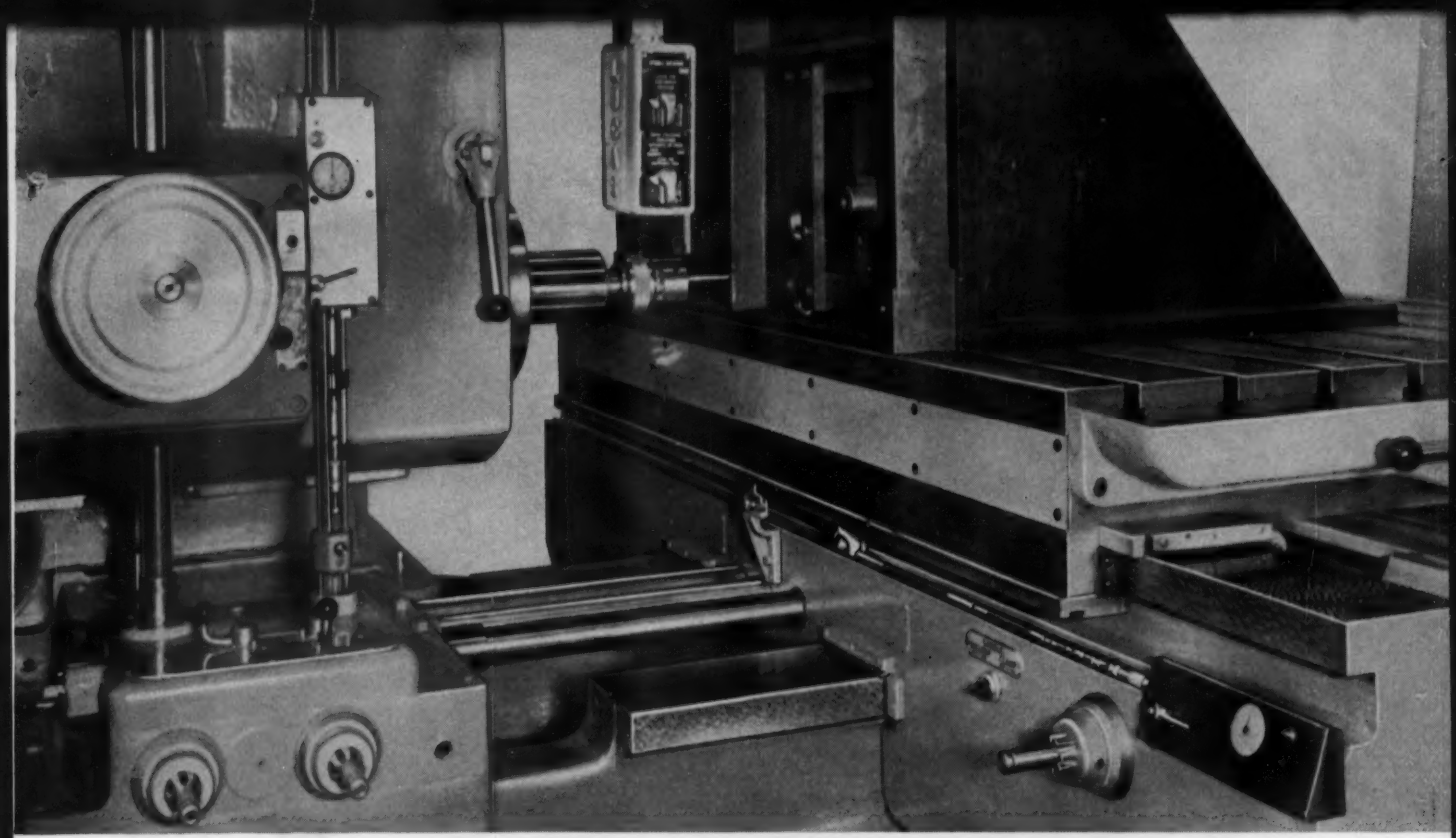
All controls are within easy reach of the operator. Chucking is accomplished during the operational cycle by manual or semi-automatic means.

This new double-end New Britain Model 365 chucker is specifically for parts which can be machined simultaneously at both ends in one chucking, or two pieces per cycle.

It furnishes the *high spindle speeds* required for work on brass and aluminum, plus *beef* for machining and threading steel, plus *accuracy* guaranteed by a new turret locking mechanism. Idle time is minimized by power chucking and rapid traverse of all slides.

If your requirements include accurate volume production of double-end work, the Model 365 New Britain chucker can be a highly efficient money-maker for you. For more information, please ask for the catalog on Model 365.

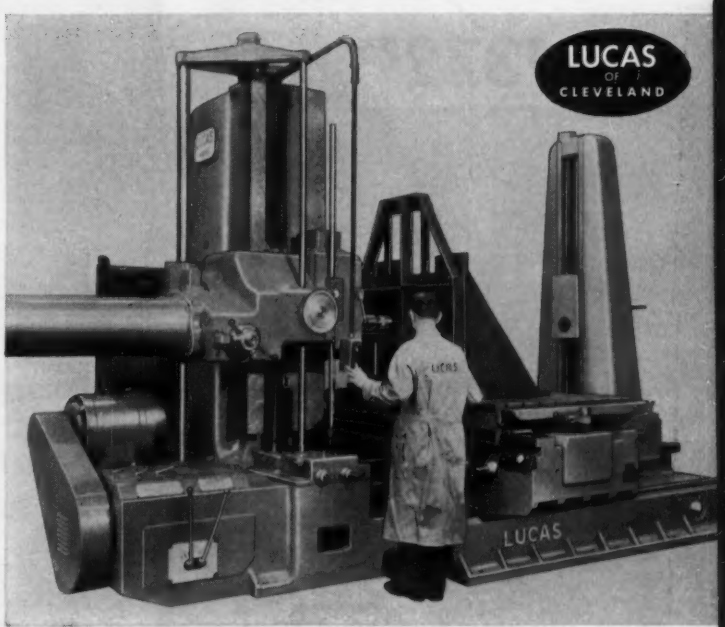




Automatic Power Positioning is a money-maker on boring machine jobs

The entire operation of setting the head and table is done through power feeds at rapid traverse speed. The operator simply inserts the proper measuring rods and starts the positioning cycle. It takes an absolute minimum of time and reduces the chance of error in locating bore centers.

Lucas pioneered and specializes exclusively in building the horizontal boring machine. The full possibilities of this multi-purpose machine are enjoyed by Lucas owners, because of the many important Lucas features and improvements — including Automatic Power Positioning, new simplified pendant control and many more. May we send you the latest descriptive Lucas catalog. Address Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.



• AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
• LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

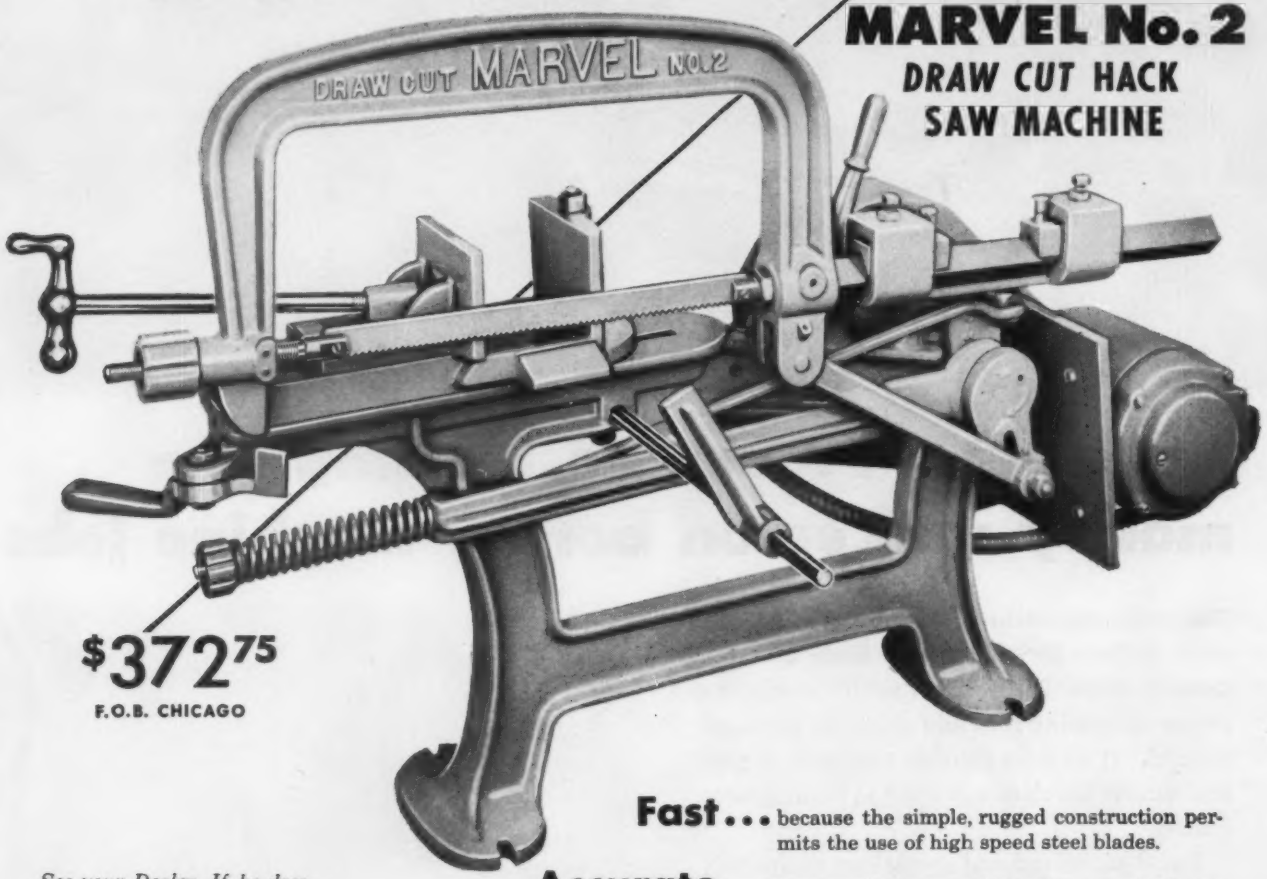
See the preceding four pages for other New Britain *New's*.

For... General-Purpose Sawing

FAST—ACCURATE—ECONOMICAL—DRY CUTTING

Capacity up to 8" round

Improved
MARVEL No. 2
DRAW CUT HACK SAW MACHINE



$372.75
F.O.B. CHICAGO

Fast... because the simple, rugged construction permits the use of high speed steel blades.

Accurate... because the improved Saw Frame with clamping type blade holders holds the blade in perfect alignment and proper tension.

Economical... because of its automatic relief on the return stroke, the blade will last and last and last.

Dry Cutting... because modern high speed steel blades will operate efficiently at 60 strokes per minute without a coolant.

See your Dealer. If he does not stock MARVEL Saws, he can get them quickly. Or simply write us for literature and delivery. When buying hack saw blades insist that your dealer furnishes genuine MARVEL High-Speed-Edge Hack Saw Blades—they are unbreakable!

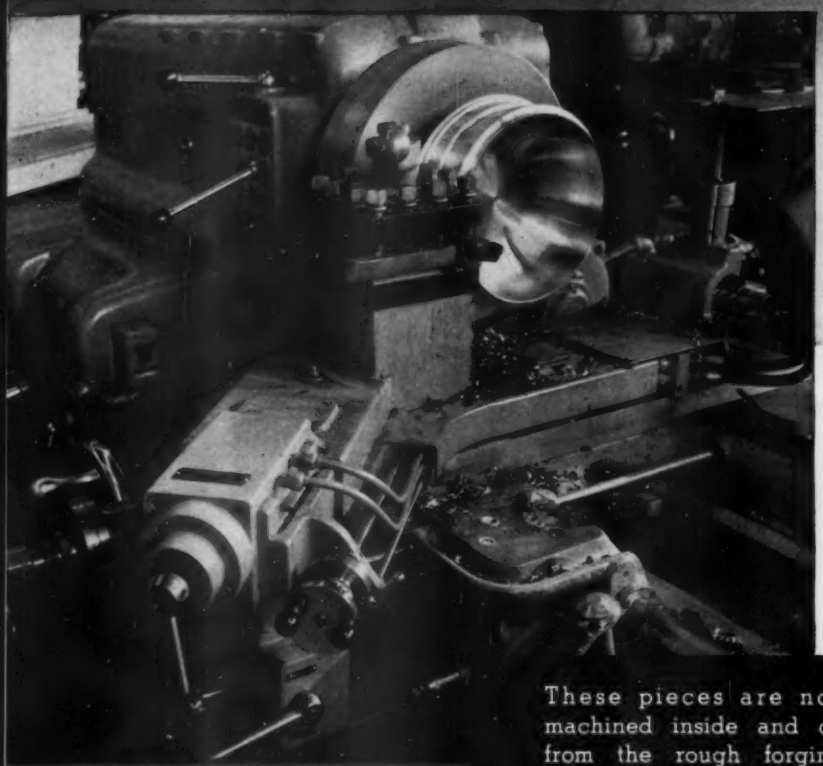
MARVEL *Metal Cutting* **SAWS**
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. · 5700 Bloomingdale Ave. · CHICAGO 39, ILL.

See the preceding four pages for other New Britain News.

Rheem solves a "toughie"

and increases production three hundred per cent



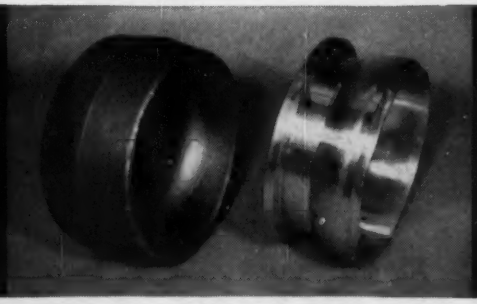
Machining the various contours of these guided missile components with the accuracy and finish required was a problem that Rheem Mfg. Co., Aircraft Division at Downey, California, had to lick.

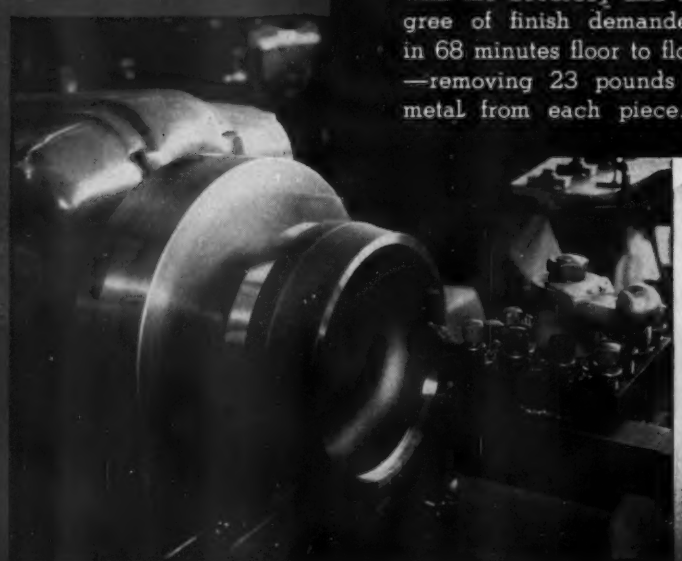
The answer . . .

"AMERICAN"

HYDRAULIC DUPLICATING LATHES

These pieces are now machined inside and out from the rough forging, with the accuracy and degree of finish demanded, in 68 minutes floor to floor —removing 23 pounds of metal from each piece.





The simplicity and dependability of the duplicating equipment plus the power and sturdiness of the "AMERICAN" Lathe proved just the right combination for this difficult job.

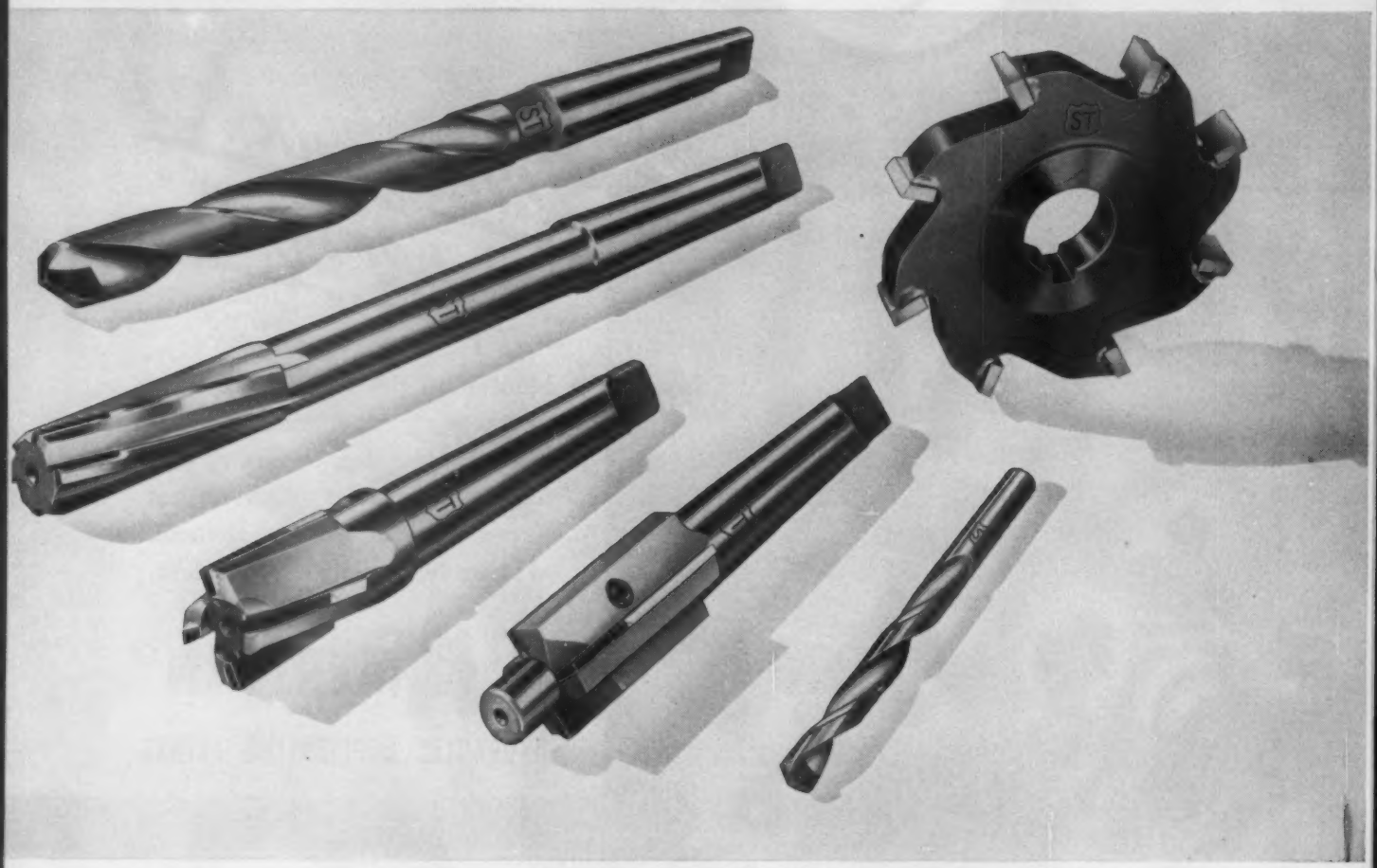
We specialize in "tough ones" —better ask us about your "problem" jobs.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

STANDARD TOOL

....serving Industry since 1881



Announces A NEW LINE OF Carbide-Tipped Tools

• To broaden its service to you, Standard Tool now offers carbide-tipped tools in addition to its regular line of industrial cutting tools.

Your Standard Tool Man, Serving Industry Since 1881, will show you many applications where carbide-tipped tools will help you get faster cutting, longer tool life.

STANDARD TOOL CO.

3950 CHESTER AVENUE CLEVELAND 14, OHIO

FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: *Twist Drills · Reamers · Taps · Dies · Milling Cutters · End Mills · Hobs · Counterbores · Special and Carbide-Tipped Tools*

Streamline Design —

and Modern Engineering Techniques are combined in the . . . . . .

BULLARD CUT MASTER
VERTICAL TURRET LATHE

Model 75

Latest Improvements Include:

PENDANT CONTROL

Exclusive Bullard design, for maximum machine control from a movable pendant station. Start and stop spindle; selection of speeds, feeds and directional movement of all heads in feed or traverse are quickly and easily accomplished from the Pendant. Interlocks and a stop-all stick provide safety for both operator and machine.

SCREW FEED FOR ALL HEADS

To assure the smooth, accurate, fine finish cutting ability of the new Cut Master Model 75, precision feed screws with adjustable bronze take-up nuts are provided for feed and traverse movement of all saddles, slides and ram. Five sided turret for "run of the mill" jobs. Four sided turret for production jobs.

Available in 26, 36, 46, 56, 66 and 76 inch sizes.

ELECTRIC CONTROL PANEL

Accessible yet concealed and protected from dust and other foreign matter.

POWER INDEXED MAIN TURRET (Optional)

For Complete information call your nearest BULLARD Sales Office or Distributor or write to . . .

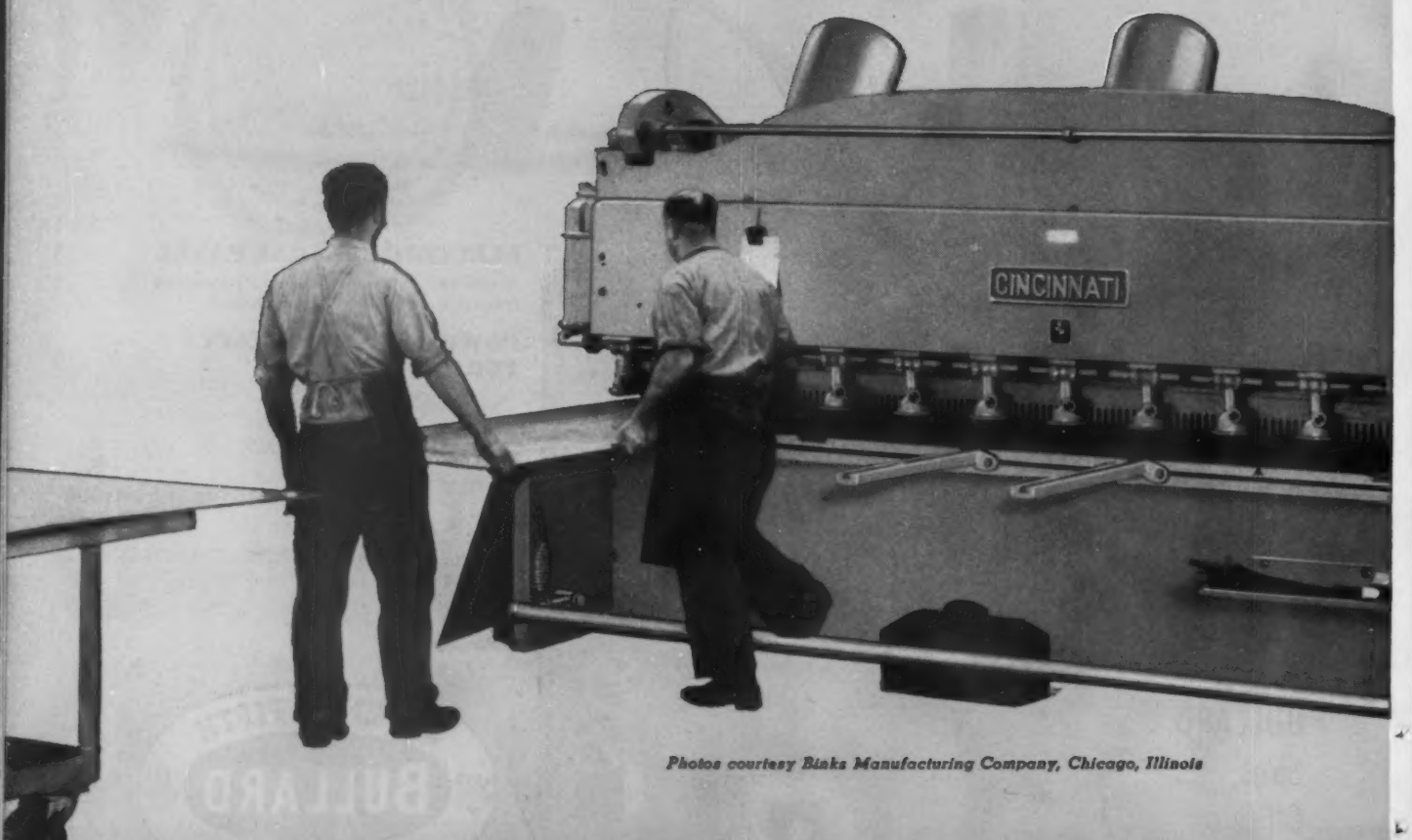
SEVENTY FIFTH 1880 BULLARD 1955 ANNIVERSARY

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

accurate CINCINNATI

shearing from 20 GAUGE SHEETS to 5/16" PLATE ...with ONE knife setting

...SPEEDS PRODUCTION



Photos courtesy Binks Manufacturing Company, Chicago, Illinois

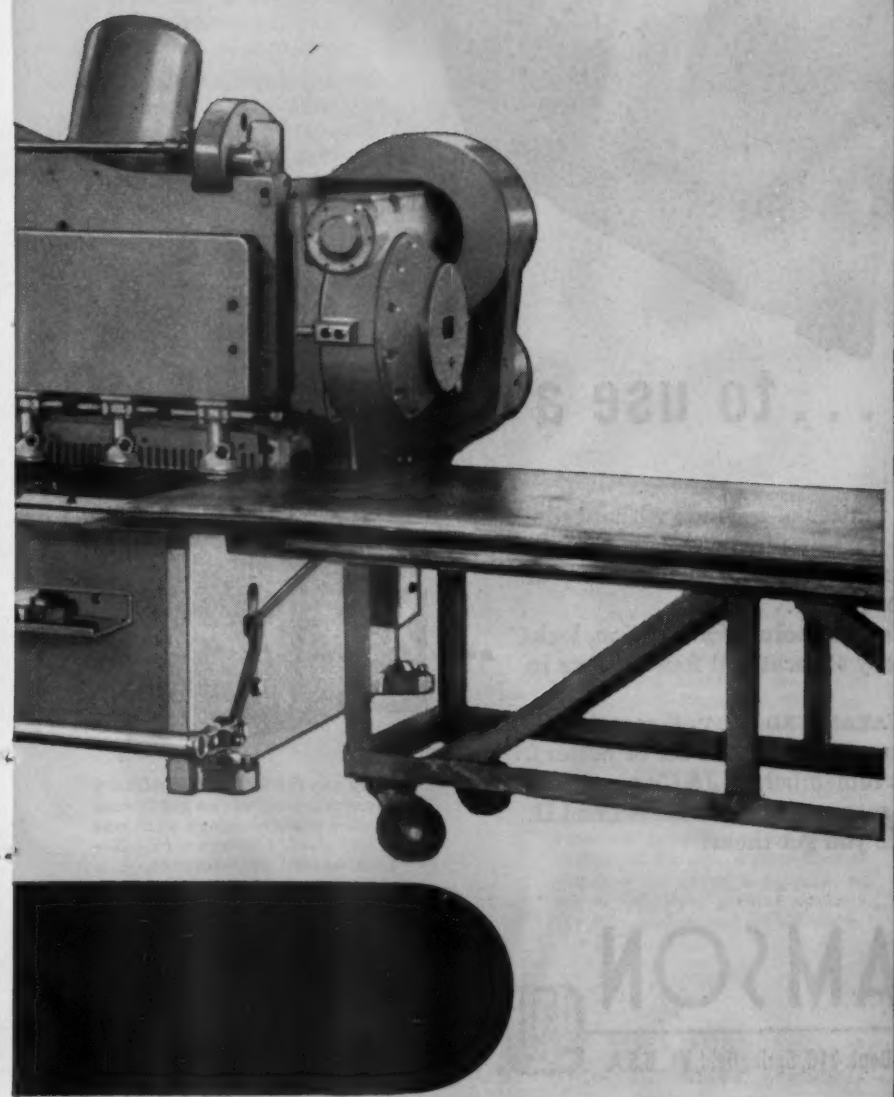
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

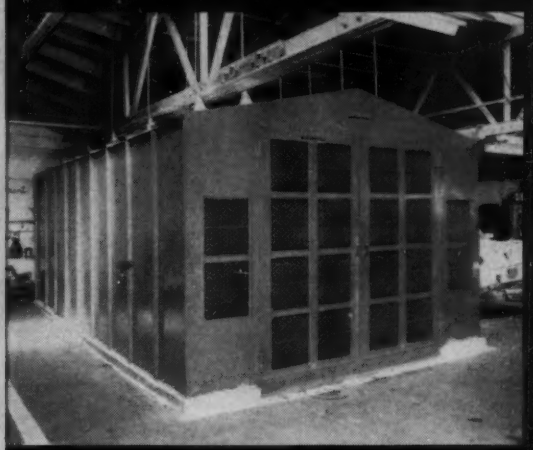
Here 20 gauge to $\frac{1}{16}$" plate is sheared with no change of knife clearance—a time saving and production increasing feature.

The Binks Manufacturing Company say this Cincinnati Shear is a very accurate machine and a most profitable investment.

Write for Catalog S-6.



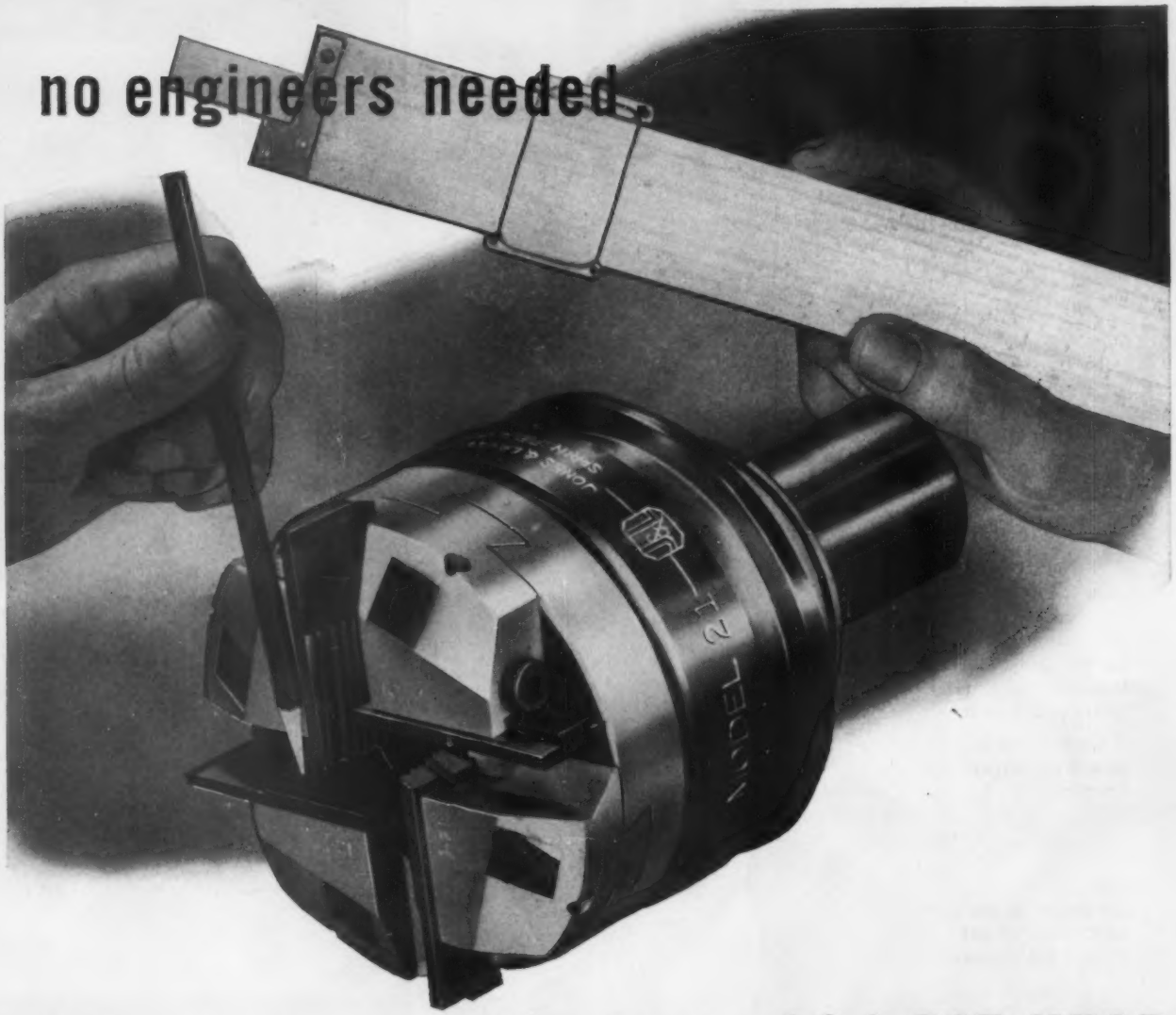
Water cooling tower



Dry auto spray booth

Water wash spray booth

no engineers needed...



...to use a J & L DIE HEAD

Here's why...

Chasers are changed and set in a matter of seconds without disturbing the holders or die head...

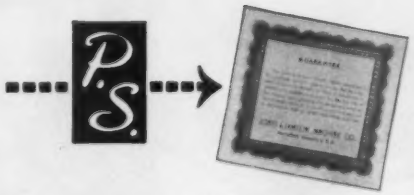
Only one set of holders is required to handle coarse, fine, or multiple threads over a wide range of sizes...

Controlled ratchet teeth provide definite points for location, locking and thrust support—making it easy to locate all four chasers in the same relative cutting position.

Best of all—the RESULTS ARE GUARANTEED... not sometimes, but *every* time. (And you get that in *writing*... Class III or better).

Disregard Class III if you like, but remember... J&L's system of *"no approximations"* adds up to even *more* savings for Class I and II.

You're paying for results... be sure you get them!



Why pay for 20 sets of ordinary chasers when you can get 20 controlled resharpenings with one set of J&L Chasers—PLUS—Guaranteed performance.

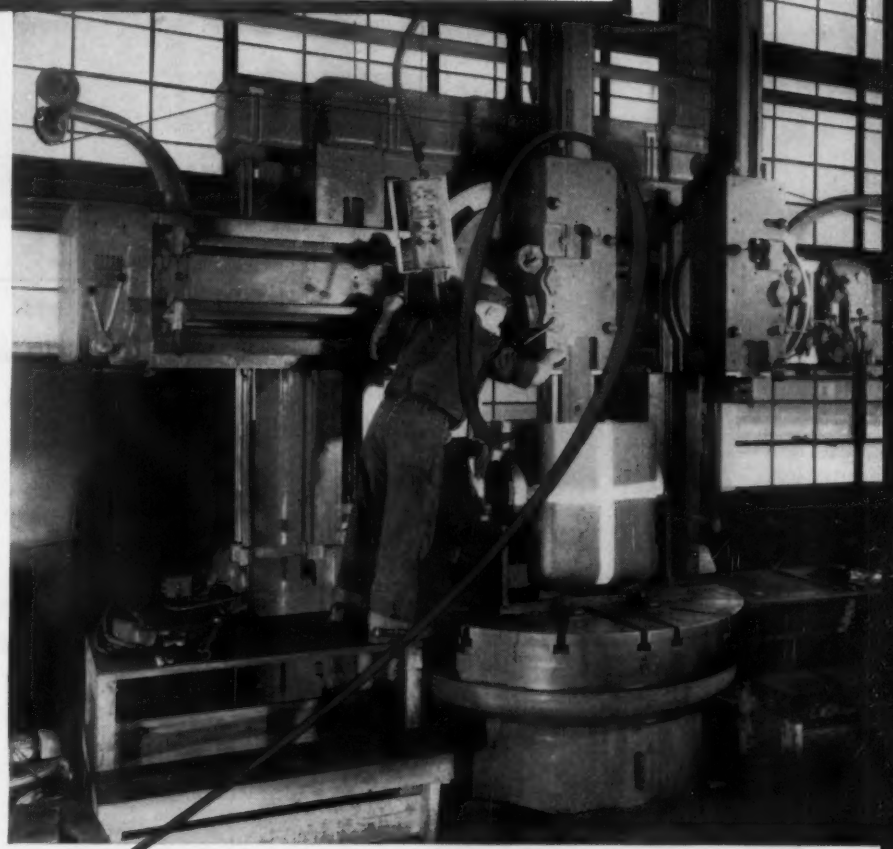
JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

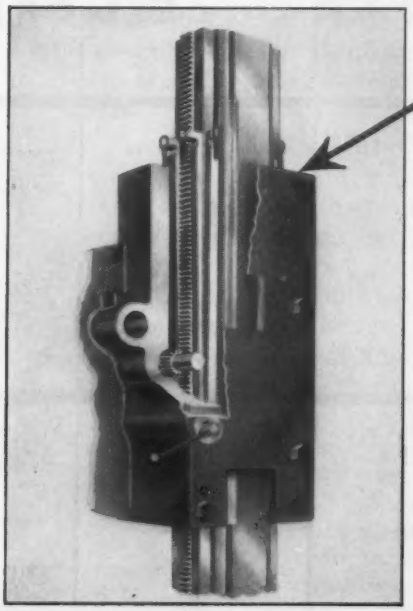
J&L THREAD TOOL DIV.

At The Oilgear Company — KING precision assures *exceptional* accuracy in taper boring

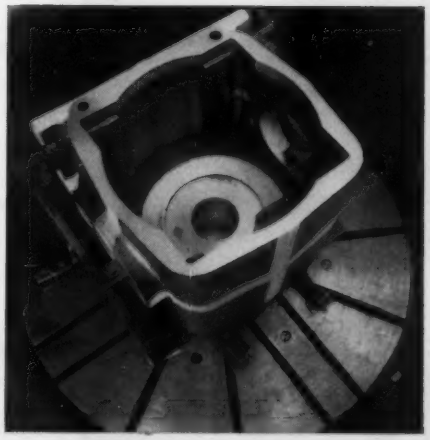


For the Oilgear Company, Milwaukee, Wisc., the 62″ King® Vertical Boring & Turning Machine, shown at right, precision-machines castings for high pressure pumps. An example of the extreme accuracy obtained is the taper boring, in Class 50 gray iron, of 7″ diameter x 8″ deep holes to .005″ per inch of taper, while holding .001″ tolerance on the diameter for the entire depth of the hole. A finish better than 125 micro-inches is maintained. On other boring, facing, and turning work—on parts for cases, end covers, rotors, etc., for 60, 100, and 150 hp. Oilgear Pumps—similar dimensional precision and fine finish are obtained.

Here again is on-the-job *proof* of how King superior design, massive proportions, and extra-rigid construction provide the ability to cut costs and improve quality on the complete range of boring, facing, and turning work. King machines are made in ten sizes, from 30″ to 144″. For full information see your King Distributor, or write us.



Cut-away drawing of rail head, at left, illustrates how extra rigidity is built into King machines, assuring an unvarying accuracy that makes possible fine-dimension tapering and other operations such as those described by the Oilgear Company . . . Drawing shows construction of support and guiding of the ram in its relation to the swivel. There are eight bearing surfaces, two on each side of the rectangular ram. Adjustment to these surfaces is obtained with the use of four gibs, two on the front and two on the side. To overcome any spreading of the guiding surfaces of the ram, a plate the full length of the swivel is tongued, as shown. Accurate guiding surfaces are thus maintained at all times.

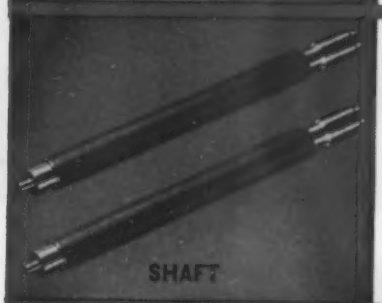


Close-up view of the work being machined above. Note the fine finish (better than 125 micro-inches) obtained on the facing work and in the tapered bore, as a result of King built-in precision features.

KING AMERICAN STEEL FOUNDRIES • KING MACHINE TOOL DIVISION
1150 Tennessee Avenue . . . Cincinnati 29, Ohio
VERTICAL BORING & TURNING MACHINES

Get **more parts** per hour

Look how MX has increased production and increased tool life on these typical screw machine parts

part	stock size	machine	operations	comparative performance				
				grade	SFM	seconds per part	production increase	tool life increase
DRUM NUT	⅝" round	Acme Gridley	drill rough form turn break down tap finish form cut off	B-1113	285	3 17	....	....
				MX	345	2.86	11%	87%
 SHAFT	¼" round	Brown & Sharpe #00	rough form finish form ream turn cut off	B-1113	255	7.0	....	....
				MX	277	4.5	55.6%	30%
WASHER	¾" round	Brown & Sharpe	drill ream cut off	B-1113	172	14.2	....	....
				MX	250	10.0	42.5%	100%
PULLEY	1⅜" round	Brown & Sharpe G-2	center drill recess, drill tap thread form face cut off	B-1113	245	35	....	....
				MX	312	27.5	27%	25%

and longer tool life

...do the job with MX

the freer-machining screw stock

Make a note of this: USS Free-Machining MX Steels *have been successfully machined at speeds approaching 350 SFM.*

A broad appraisal of all screw machine operations shows that the *average* speeds used are under 250 SFM and that only a small percentage of parts are machined at speeds in excess of 300 SFM.

So unless you are operating at the highest speeds—and comparatively few shops are—you simply don't need and can't take advantage of any greater machinability than MX offers.

Remember that USS Free-Machining MX is designed to ensure *maximum* cutting speeds compatible with *economical* tool life. And it does. Wherever fast-cutting MX is put to work, production goes up and costs come down. From results obtained in shops that have used MX in more than a billion parts of many different kinds, we feel sure that MX will cut the cost of *any* part you now machine from ordinary screw stock. It does this in four ways.

By increasing the rate of production, *MX lowers the cost per part.* By prolonging tool life, *MX reduces down time.* By assuring better part finish, *MX often eliminates extra finishing operations.* By providing closer dimensional accuracy, *MX helps to minimize rejections.* In short, USS Free-Machining MX offers you greater economy and greater efficiency in your machining operations.

In view of these facts we suggest that you carefully review your screw machine operations. If you normally operate at speeds lower than 350 SFM, your best bet is USS MX, either Bessemer or Open Hearth. You'll be money ahead – get more parts per hour, longer tool life and better parts—if you use MX, which you can buy at the *same* price you pay for comparable grades.

USS Free-Machining MX is produced in all the popular screw stock sizes. It is sold in cold-finished form by your regular supplier either as "MX" or under his own identifying trade name. In hot-rolled form MX is available through our nearest district sales office.

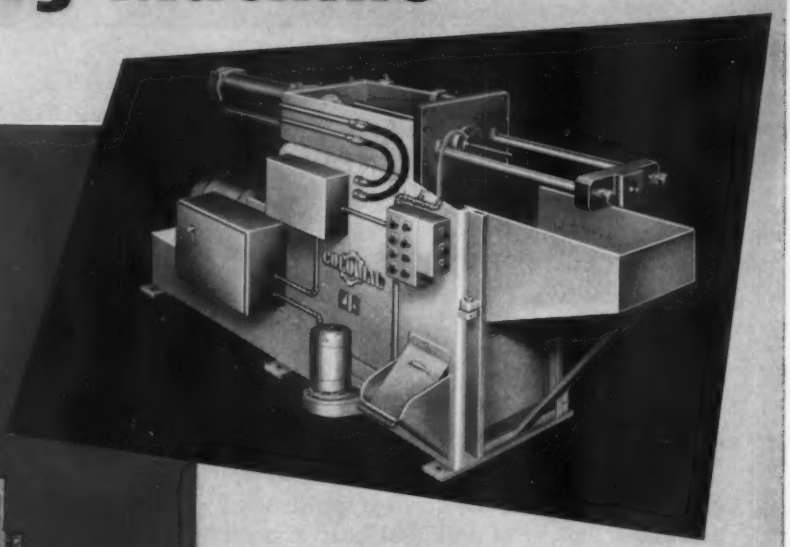
UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

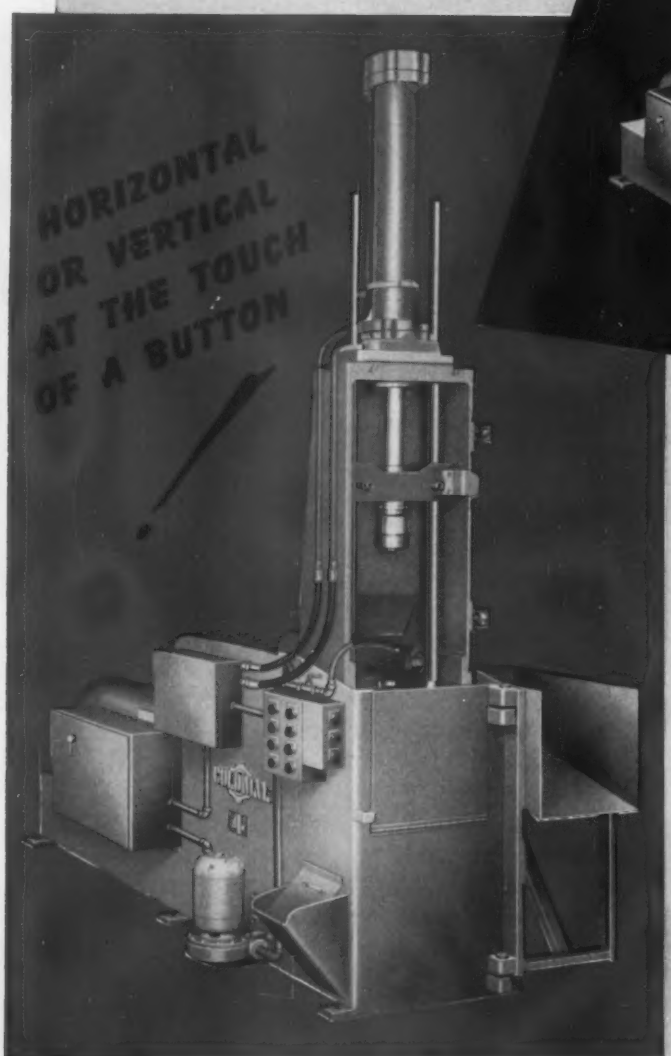
USS

UNITED STATES STEEL

Announcing....

the COLONIAL "4" *Convertible* Broaching Machine





This amazing new Colonial "4" broaching machine is the answer for the shop that requires a broaching machine flexible enough to be changed from horizontal to vertical and back in a matter of seconds.

It is truly multi-purpose— performing any of four operations:

1. **Push broaching**
2. **Pull-down broaching** } **vertical position**
3. **Press work**
4. **Pull broaching.....horizontal position**

Rated capacity is six tons for pull-down broaching, push broaching, or press work, and four tons for horizontal pull broaching. Stroke capacity is 28" in horizontal and 24" in vertical position. Guide-bar construction maintains accurate alignment throughout the working stroke for pull-down broaching. Safety interlocks prevent tilting the machine unless the ram is retracted.

Ask for bulletin FW-55 for complete description of the Colonial "4" Convertible.

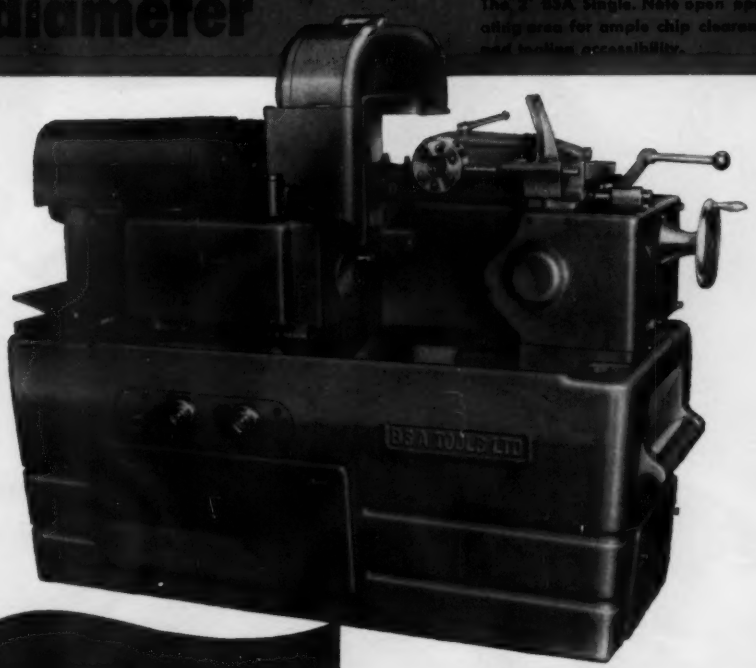
PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13

your best bet... BSA single spindle automatic screw machines

for fast, economical single spindle bar work up to 2" diameter



The 2" BSA Single. Note open operating area for ample chip clearance and tooling accessibility.

- BSA Tools Ltd. of England, one of the world's oldest and largest machine tool builders, have produced and distributed thousands of these BSA "Singles" since they introduced them in 1926.
- Available in five standard capacities: ½", ¾", 1", 1⅜", and 2".
- All models use STANDARD AMERICAN TOOLING.
- Wide range of spindle speeds —200 to 6000 on ½" machine, 69 to 1260 on 2" model.
- Cams, change gears and tooling easily accessible for quick job-to-job changeover.
- Unit construction provides quick access for easy maintenance.
- Special spindle mounting, designed to reduce wear.
- Cross slides and turret mounted on replaceable ways.
- Positive chain drive from gear box to spindle prevents slippage.

distributed and serviced in U.S.A. by NATIONAL ACME

Since their introduction in this country, BSA Single Spindle Automatic Screw Machines have enjoyed remarkable acceptance. Combining latest automatic screw machine principles with proven design, they have produced at top standards of speed and accuracy with minimum upkeep.

BSA "Singles" are distributed and serviced in the United States by National Acme, in Cleveland, where adequate replacement parts are stocked —and you get the same active, experienced and interested service support as that on which National Acme's reputation has been built.

For specifications on all sizes, write for Bulletin BSA-54

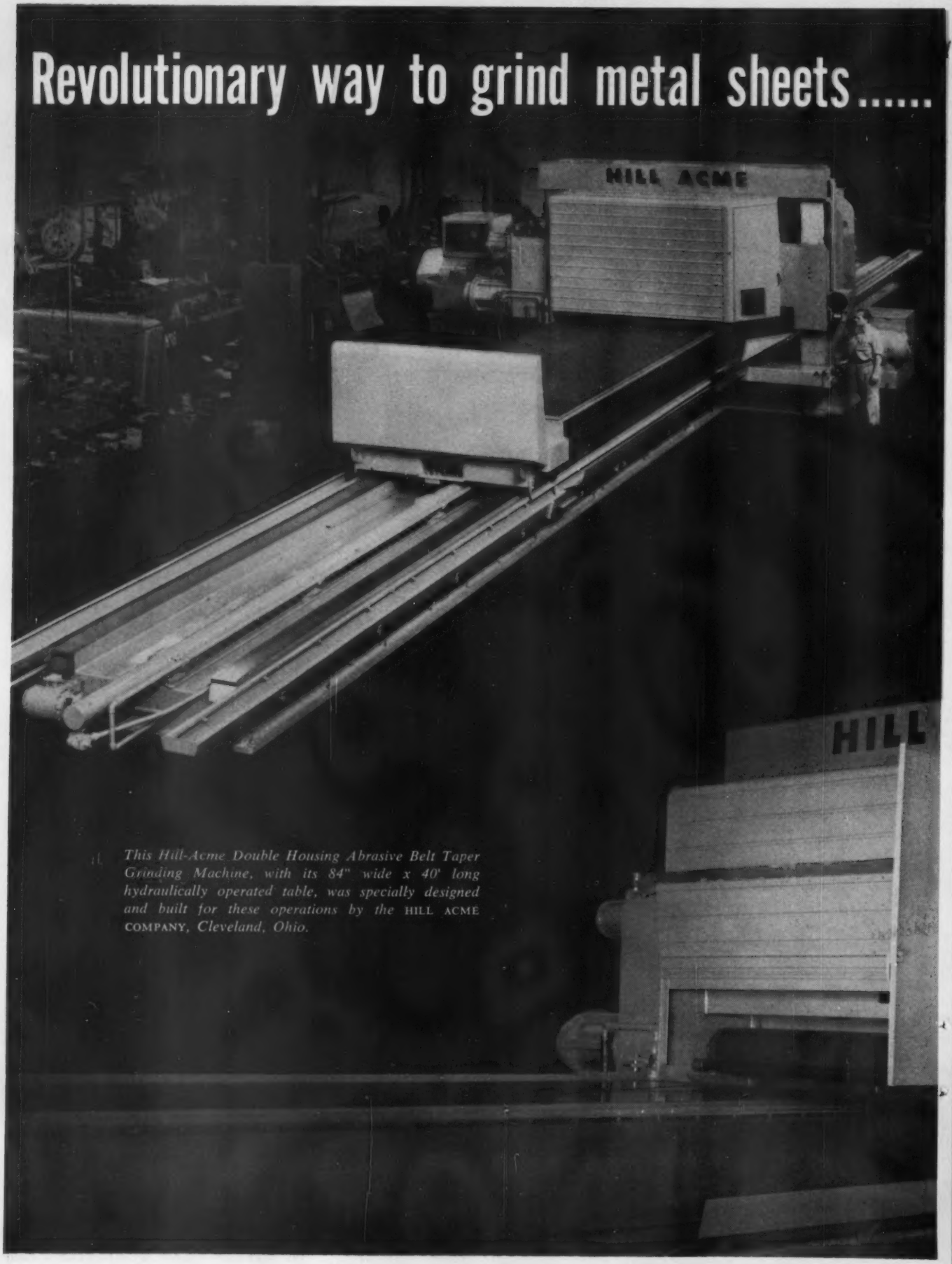
OUR JOB: to provide the *Right Machine* for YOUR JOB

Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Switches • Solenoids • Contract Manufacturing.

THE NATIONAL ACME COMPANY

171 EAST 131st STREET • CLEVELAND 8, OHIO

Revolutionary way to grind metal sheets.....



This Hill-Acme Double Housing Abrasive Belt Taper Grinding Machine, with its 84" wide x 40' long hydraulically operated table, was specially designed and built for these operations by the HILL ACME COMPANY, *Cleveland, Ohio.*

Solenoids • Contract Manufacturing.

...with the Hill Acme precision grinding and polishing machine and Behr-Manning abrasive belts!

HERE'S ANOTHER MILESTONE in the swift advance of "industry's fastest developing production tool" — abrasive belts. The job is to grind and finish aluminum aircraft wing sections, so large that they are handled by a sheet loading device equipped with vacuum cups, and are then firmly held on the table of the machine by vacuum chuck. The belt itself is actually *86" wide*. Its exceptional size requires a special fixture to mount it on to the rolls of the machine. To make this big belt, several sections are joined, with all seams on the bias. Only meticulous precision methods and equipment, available at BEHR-MANNING, could successfully build these huge belts, assuring their constant uniformity.

Whether you're finishing big surfaces like this, or intricate contours requiring a belt only ¼" wide, check with your nearest BEHR-MANNING Application Clinic for the latest time-saving method. See your local BEHR-MANNING Representative, or write direct to Behr-Manning, Troy, N. Y., Dept. AM-3.

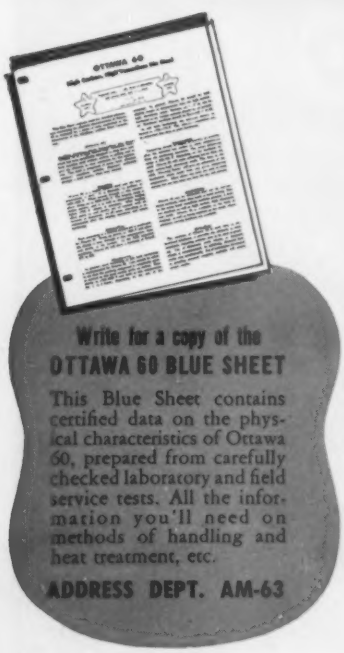
In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

BEHR-MANNING
division of NORTON Company
▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES

The big belt being transferred to the machine. Note the bias seams in the built-up belt, avoiding any resulting marking on the work. When in operation, the belt is enclosed, as a heavy flow of coolant is used.

For the newest in coated abrasives ...watch BEHR-MANNING!

G-3



Write for a copy of the OTTAWA 60 BLUE SHEET

This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.

ADDRESS DEPT. AM-63

OTTAWA 60 is a *new* die steel, an A-L "original," developed primarily to deep draw and form stainless steel. As intended, it performs without galling or pickup and shows exceptional wear resistance in that service. We have plenty of case histories to show you in proof.

But *wherever* you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-hardening die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. *Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.*

● You can solve many a problem and save real money with Ottawa 60 draw dies! Write for information or call in our Field Service Staff to help you get started. ***Allegheny Ludlum Steel Corporation, Oliver Bulding, Pittsburgh 22, Pa.***

For complete **MODERN** Tooling, call

Allegheny Ludlum

WBD 5463

AL® FINE TOOL STEELS SINCE 1854

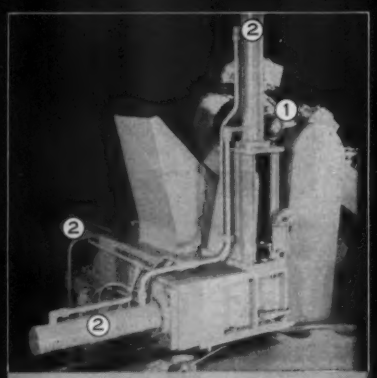
HOW W. F. & JOHN BARNES

SPECIAL EQUIPMENT

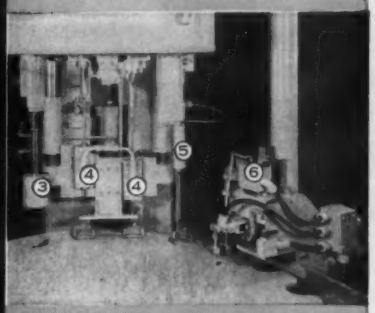
DESIGNING AND

BUILDING SERVICE

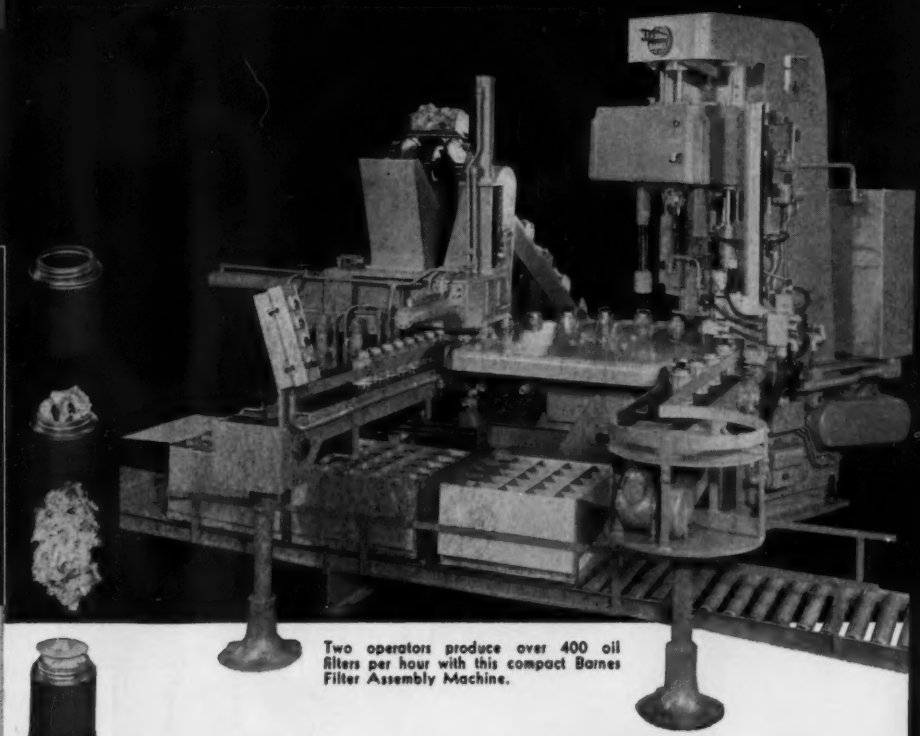
increased production 220% *through* AUTOMATIC ASSEMBLY *of oil filters*



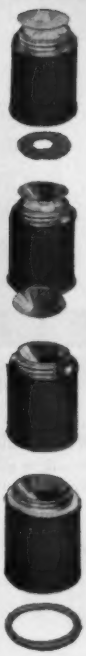
Operator stationed at front of machine feeds empty cans from cartons at the left-hand side. Cans are automatically conveyed to star wheel. Second operator at rear of machine measures cotton waste, which conveyor (1) carries to hopper of compressing and loading cylinders (2). Same operator places wire screen and retainer on filter as it indexes to the next station.



Automatic plunger (3) forces screen and retainer into filter body. Two oscillating air drills (4) weave oil hole through cotton waste. Automatic gauge (5) checks depth of hole, ejecting defective units from machine. Next unit (6) automatically adds cork gasket to complete the assembly. Cartons are moved along conveyor to the discharge side of the machine, where they are repacked with completed filters.



Two operators produce over 400 oil filters per hour with this compact Barnes Filter Assembly Machine.



Oil Filter assembly production boosted from 125 to over 400 units per hour . . . that's the result story of this Barnes Filter Assembly Machine now at work for a large farm implement manufacturer. And equally as important, a higher-quality, more uniform product is being obtained with only one-third the personnel formerly required.

Once again the wide experience of W. F. & John Barnes Process Equipment Division has enabled another manufacturer to substantially reduce production costs and improve product quality. This special machine is only one of many widely diversified types now successfully and profitably cutting costs and increasing production output in hundreds of plants throughout the country.

Here at Barnes you'll find the varied engineering and creative skills, PLUS over 75 years of machine building background, to help you solve troublesome production problems. And because all planning, engineering, and manufacturing efforts are closely coordinated, you have available a complete *Automation Equipment Service* from one convenient and *experienced* source.

ASK TO HAVE YOUR PRODUCTION METHODS ANALYZED

Find out how these unique creative and specialized resources can help you cut costs. Your problem will be given expert and individual attention.

GET THIS *Free* BOOKLET

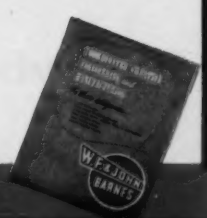
Write today for your copy of "Coordinated Creative Engineering and Manufacturing" — a 32-page booklet of cost-cutting *Automation Equipment* ideas.

W. F. & JOHN BARNES

W. F. & JOHN BARNES COMPANY

PROCESS EQUIPMENT DIVISION

413 SOUTH WATER STREET • ROCKFORD, ILLINOIS



BUILDERS OF BETTER MACHINES AND EQUIPMENT SINCE 1872

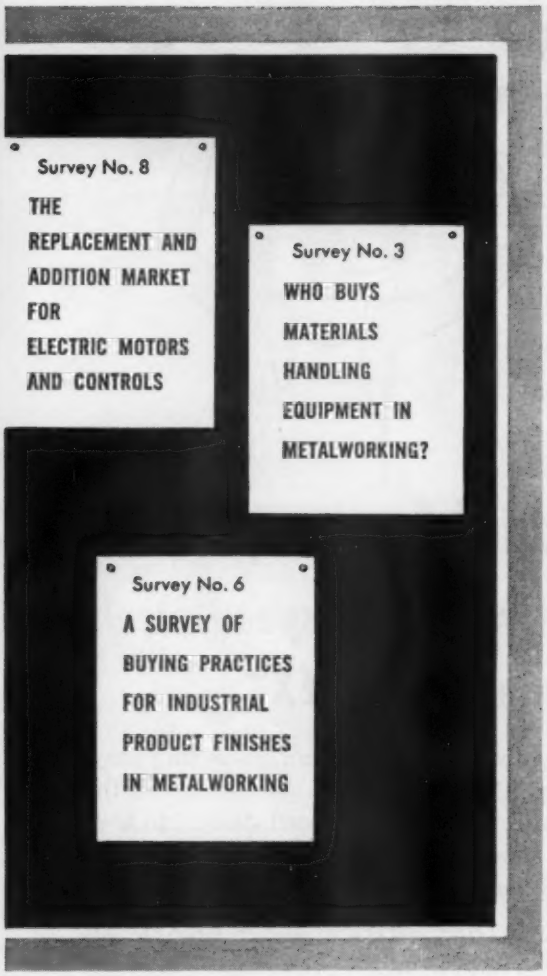
"Metalworking will tell you why PRODUCTION is 'in' on all

Survey No. 1
WHO BUYS MACHINE TOOLS IN METALWORKING?
Survey No. 2
DESIGN ENGINEERS REPORT BUYING PRACTICES FOR MATERIALS AND PRODUCT PARTS
Survey No. 5
THE HEAT TREATING MARKET IN METALWORKING
Survey No. 7
HOW PRODUCTION EQUIPMENT IS BOUGHT IN METALWORKING
Survey No. 4
A SURVEY OF BUYING PRACTICES FOR ELECTRIC MOTORS AND CONTROLS

WOULD YOU LIKE COPIES OF ANY OF THESE SURVEYS?
We will be glad to send them to you.
Write to American Machinist Research Department at the address below.

Everybody sells MORE to Metalworking when

its buying"


Survey No. 8
THE REPLACEMENT AND ADDITION MARKET FOR ELECTRIC MOTORS AND CONTROLS
Survey No. 3
WHO BUYS MATERIALS HANDLING EQUIPMENT IN METALWORKING?
Survey No. 6
A SURVEY OF BUYING PRACTICES FOR INDUSTRIAL PRODUCT FINISHES IN METALWORKING

THE QUICKEST WAY to know who in Metalworking influences your products' purchase is to *ask Metalworking.* And throughout this giant industry, the answers will put Production at, or very near, the top of every list.

Purchasing will tell you it buys the machinery Production specifies. *Design-engineering* will report that it seeks Production's recommendations on original equipment above all others. *Corporate Management* will tell you it leaves the choice of types and makes up to Production, generally concerns itself with financial approval only.

Thus, as the eight surveys pictured here typically show, Metalworking is first to recognize the fundamental buying influence of the men who USE and APPLY everything that helps produce, or goes into, the products Metalworking manufacturers. When you think about it, you couldn't expect it to be any other way. What's more . . .

950 American Machinist advertisers will confirm what Metalworking tells you

They confirm it by investing more advertising pages and dollars, for the products used and bought by Metalworking, in this magazine than are invested in any other. They do this because they *know* you must sell Production to sell Metalworking . . . and *American Machinist* delivers far more production-responsible subscribers than any other metalworking magazine in the world.

There's good reason to believe this same formula is a sound one for you. And there's no better time to find out than *now* . . . when *American Machinist's* circulation leadership, and persuasive hold on metalworking production, are at an all-time high.

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they sell PRODUCTION MANAGEMENT

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...and with high speed steels the standard is REX

Living up to a standard for comparison isn't easy. That's why Crucible lavishes special care on the manufacture of REX® high speed steels... to keep REX the *standard* wherever high speed steels are used—as it has been for over half a century.

It's easy to *prove* the superiority of REX. Use it on the job... check its size, structure, response to heat treatment, fine tool performance. You'll agree with thousands of other users—*you can't find a high speed steel to outperform REX.*

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CRUCIBLE first name in special purpose steels

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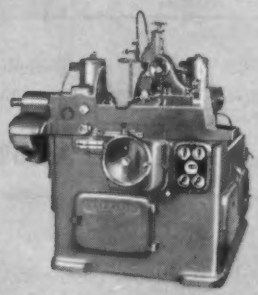
SHEFFIELD MACHINE TOOLS
guard *PRECISION* in the shop

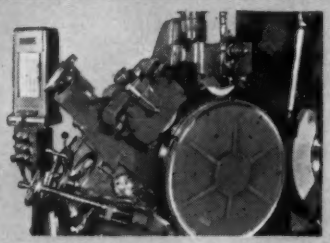
Micro-form Grinder, Model 121 grinds high precision profiles both flat and circular directly from large scale drawing, saving up to 75% over conventional practice. 14

Micro-form Grinder, Model 122 equipped with a combination 30 power microscope and viewing screen. 15

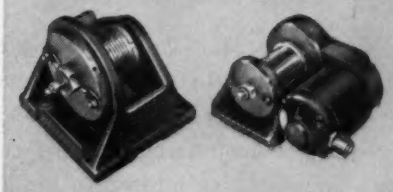
Thread and Form Grinder, Model 133 uses the multi-ribbed wheel principle to grind small precision threads and intricate forms on a high production basis. 16



Precision Thread and Form Grinders —100 Series, produce precision threaded elements and cylindrical forms by the Crushtrue method, the diamond dressed multi-ribbed wheel or the single point wheel method. 17



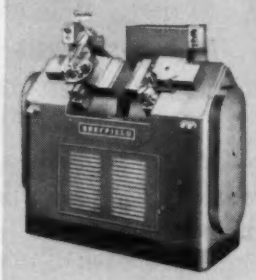
Special machine tools are a Sheffield specialty, such as this one of 12 jet turbine shroud grinders placed in operation within the last six months. 18



Idler and motorized type Crushtrue devices are available for forming grinding wheels on standard surface grinders. 19

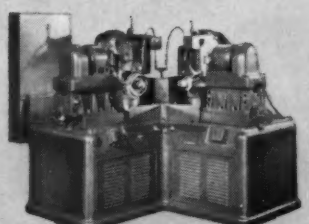
The Sonicut Cavitron, Sheffield's new Ultrasonic Machine Tool, machines the hardest metals and minerals known to man to any desired thickness or shape with selected surface finish. 20

The Sheffield Crushtrue Roll Bank plan provides Rolls for production use while worn rolls are enroute to Sheffield for re-grinding and re-ground rolls are enroute from Sheffield for use. Nominal exchange charge. 21

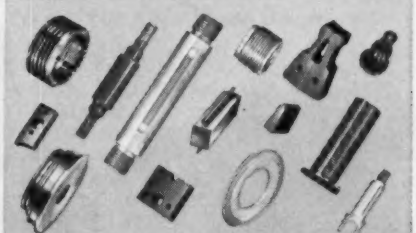


Gear and Spline De-burrers deburr or chamfer up to 600 gear teeth per minute. Applicable to spur, helical, hypoid, bevel and herringbone gears —also multi-start worms. 22

Gear and Spline Chamfering Machines chamfer, burr or recess the ends of gear teeth at high production rates—ideal for short runs and quick changeover. 23



Style "C" Gear and Spline Chamfering machines have two cutter spindles and two workheads for mass production gear manufacture. 24



Sheffield is prepared to produce precision threaded elements and formed parts on contract to augment your own manufacturing facilities. 25

6785

Write for Engineering Data on any or all of these tools identifying them by key numbers in the white squares.

Division 1 • The Sheffield Corporation
Dayton 1, Ohio, U.S.A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

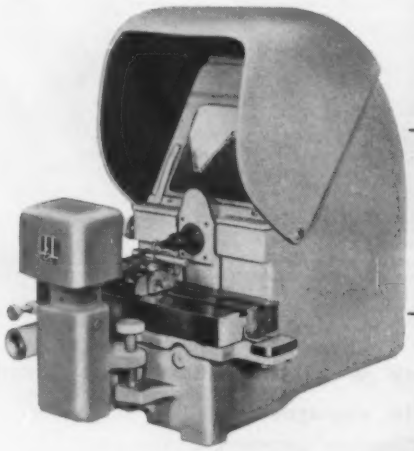
HOW TO "GUARANTEE A GUARANTEE"

Every set of Jones & Lamson Die Head chasers carries this full guarantee: *to produce Class III threads, or better, across the board.* To insure this guarantee, and to keep manufacturing costs down, J&L carries on successive interoperation inspections the positive way, with Jones & Lamson Optical Comparators.

(We practice what we preach)

Avoid costly work on scrap—
Prove machining results before subsequent operations

Controlled quality means lower costs. Use J&L Comparators on *your* production line . . . their versatility is unlimited.



Write Dept. 710 for information on Comparators and/or Jones & Lamson Thread Tool Products.

FIRST	Dovetails of chasers are straddle milled. Tolerances checked on **The J&L OPTICAL COMPARATOR**
THEN	Mill angle on front end of chaser. Length and angle checked on **The J&L OPTICAL COMPARATOR**
THEN	Dovetail angle milled. Angle and centerline checked on **The J&L OPTICAL COMPARATOR**
THEN	Ratchets for spacing are milled. Chaser length, ratchet form and spacing checked on **The J&L OPTICAL COMPARATOR**
THEN	Back chamfer is milled. Angle and flat checked on **The J&L OPTICAL COMPARATOR**
THEN	After heat treating, dovetail is ground. Angles, flats and depth inspected on **The J&L OPTICAL COMPARATOR**
THEN	Grind thread form. Thread form, angles, root, crests, spacing, lead and helix checked on **The J&L OPTICAL COMPARATOR**
THEN	Chamfer ground as specified. Angle and amount below root checked on **The J&L OPTICAL COMPARATOR**
THEN	Top rake ground. End grind and point height checked on **The J&L OPTICAL COMPARATOR**

JONES & LAMSON

World's largest manufacturer of Optical Comparators since 1919

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OPTICAL COMPARATOR DIV.

THE MACHINE TOOL SHOW

ACCO products

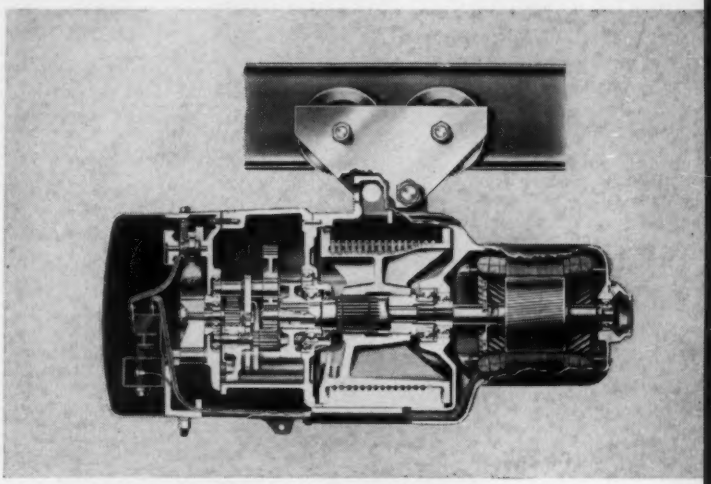
Why WRIGHT *Speedway* Hoists Merit Full Confidence of Both Production and Maintenance Men

Wright Frame 1 Speedway ¼ to 1-ton

It's a heavy-duty workhorse for Production Men...

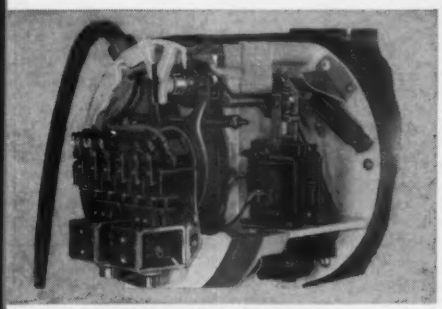
because of sound, generous and practical design of all components, plus standard NEMA specification totally enclosed motors. Heavy-duty design and fine balance give users definite assurance that 1954 Model WRIGHT *Speedway* Frame 1 Hoists will handle tough jobs on any duty cycle for which 1½ H.P., 30-minute NEMA motors are satisfactory. We guarantee this.

A New Booklet, #**DH-133B**, tells the full story of the many fully-tested structural, electrical and mechanical features that make WRIGHT Frame 1 *Speedways* ideal for production materials handling work. Write our York, Pa., office for your copy of this book that is pictured below.

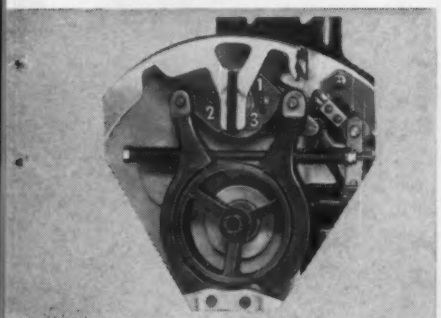


The ideal hoist for production work

It's the easiest hoist for Maintenance Men to service...



Easiest to get at



Nothing to adjust but the cam!

because those components that are most likely to need service or adjustment—on any hoist—are fully accessible when the end housing and side cover are removed as shown in the picture at the left. Removal of housing and cover is a simple matter of loosening or removing a few screws.

To compensate for brake lining wear on the motor brake on these 1954 Model WRIGHT *Speedways*, there is nothing to adjust but the cam. This adjustment is literally "as simple as ABC." Cam settings are pre-determined and numbered. There is no guess work. The long, calibrated compression springs and the solenoid are factory-set... they NEVER need adjustment for brake lining wear.

Write for this New Booklet

Write our York, Pa., office for this New Booklet, #DH 133B. It gives complete information on the 1954 Model WRIGHT *Speedway* Electric Hoists, Frame 1 and 1½ (500 to 4000 lb. capacities). The booklet fully describes the many electrical, mechanical and structural features that make these WRIGHT Hoists ideal for production and maintenance men.

ACCO

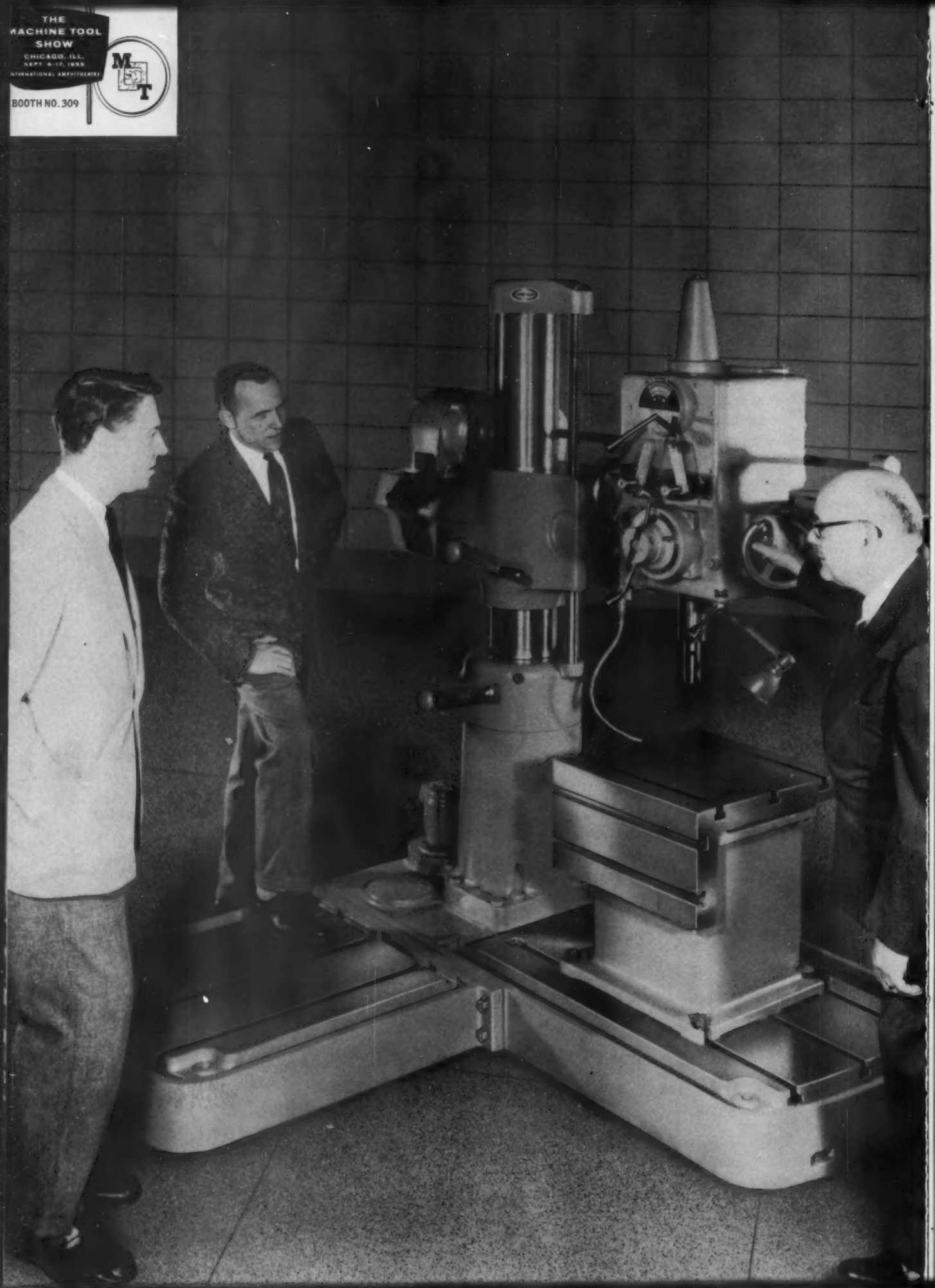
TRADE MARK

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Hoists
Trolleys
Cranes

Easy to operate. Controls for 9 spindle speeds, 6 power feeds grouped conveniently for the operator. Simple


THE
MACHINE TOOL
SHOW
CHICAGO, ILL.
SEPT. 9-17, 1955
INTERNATIONAL AMPHITHEATRE
BOOTH NO. 309
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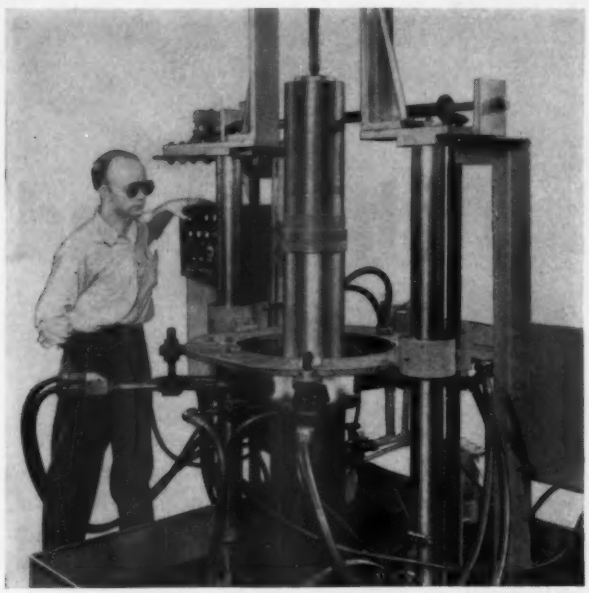
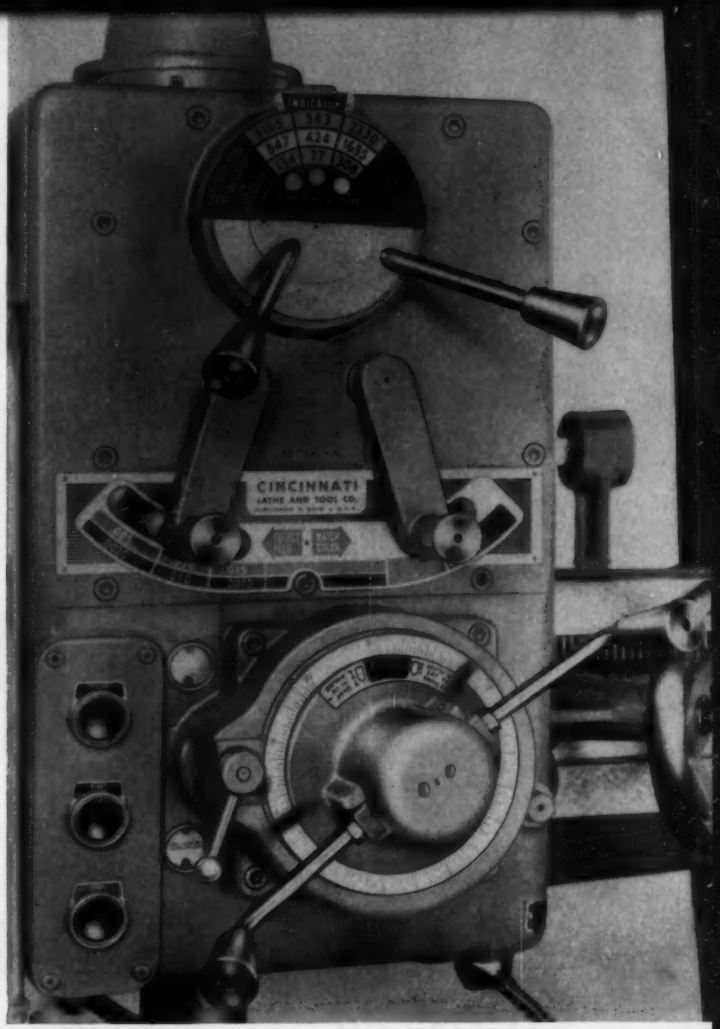
Easy to operate. Controls for 9 spindle speeds, 6 power feeds grouped conveniently for the operator. Simple color-matched speed and feed selection dials. No. 3 Morse taper spindle; 1½″ capacity in cast iron. Unit construction throughout; hardened steel gears; forced-spray lubrication.

Flame-hardened column. 7½″ FLAMATIC hardened column provides a rigid cylindrical way for the 3′ arm. Column is mounted on heavy-duty, antifriction roller bearings in a sturdy column support. Waffle-ribbed base of adequate floor area and weight to provide stability.





NEW LOW-COST CINCINNATI RADIAL DRILL RETAINS BUILT-IN ACCURACIES

FIRST WITH A HARD CLAD COLUMN

Researched—in the company's laboratories. Problem: how to retain built-in accuracies and prevent column scoring.

Engineered—to provide a thick-walled, centrifugal casting of close-grained iron; accurately turned on modern, high-speed lathes; surface hardened; then ground to close tolerances and a mirror-like finish.

Tested—by subjecting the new column to years of round-the-clock operation.

Approved—by the men who know machine tools best—the users.

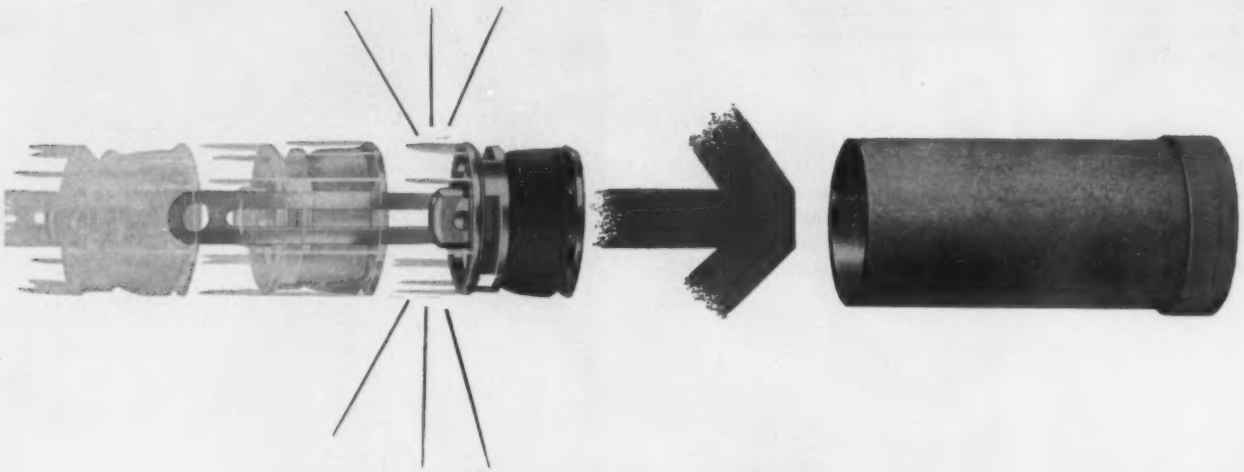
Priced—attractively for contract and job shops, toolroom and maintenance use, and manufacturing plants.

Available—*now* from CL&TCO authorized machine tool dealers in all major centers. Write to Cincinnati Lathe and Tool Co., Cincinnati 9, Ohio, for catalog D-133 and name of nearby dealer.

LOOK FOR THIS TRADEMARK

CINCINNATI LATHE AND TOOL CO.

FLAME-HARDENED
HardClad
COLUMN



How to soak up shock and

Underwood Corporation did it by using Republic ELECTRUNITE Stainless Steel Tubing

This was the problem: find a material for the cylinder in the carriage shock absorber on an accounting machine. The cylinder must have an accurate bore, little variation in diameter, and negligible eccentricity. It must also have a suitable finish to reduce drag, because the piston which fits inside must be completely retracted in less than a tenth of a second.

Republic metallurgists suggested ELECTRUNITE Stainless Steel Tubing. It was drawn to meet dimensional requirements. The finish was excellent. And Underwood reports good service life because of excellent wearing qualities.

REPUBLIC STEEL CORPORATION
3102 East 45th Street
Cleveland 27, Ohio

REPUBLIC STEEL

Please send me more information on:

- ☐ Enduro Stainless Steels
- ☐ ELECTRUNITE® Stainless Steel Tubing and Pipe
- ☐ Republic Cold Drawn Steels
- ☐ Republic Titanium and Titanium Alloys

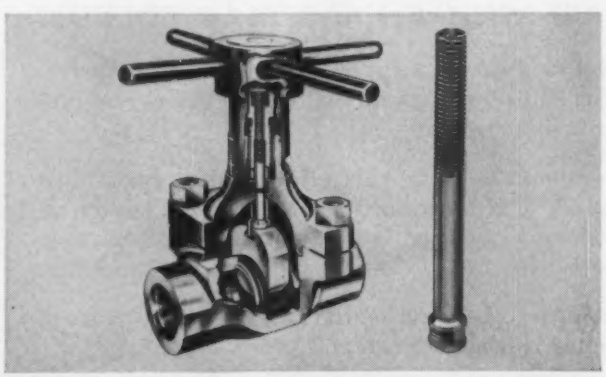
Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

M-7665-A



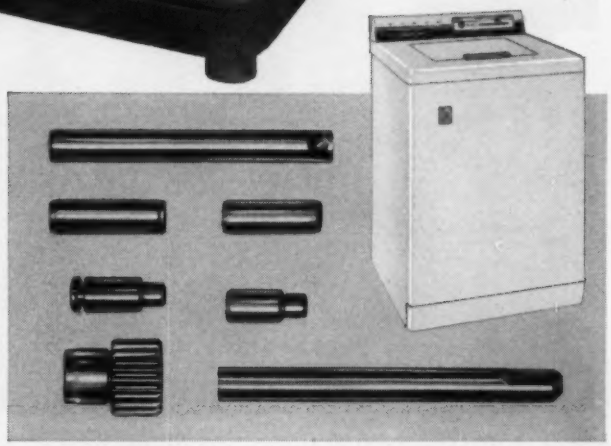
MAKE DUPLICATE STAINLESS STEEL PARTS ECONOMICALLY out of Republic Enduro Stainless Steel Cold Drawn Bars. Edward Valves, Inc., makes this part for its new MUDWONDER valve out of Types 410 and 416. The company's methods engineers say they get good production for these reasons: high speeds and feeds can be used; surface finish is excellent; tool life is longer, downtime for re-grinding is less.

cut costs!

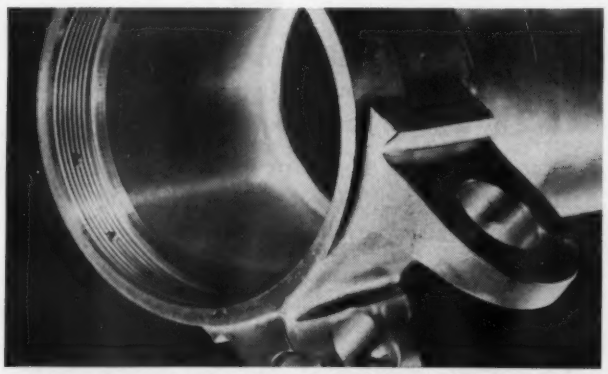
Underwood now saves 75 cents on material costs for each shock absorber.

This is only one of many customers for whom Republic has saved money. Sometimes we save material costs. Sometimes production costs. Often, both. And since we manufacture both stainless steel and carbon steel tubing in many analyses, we are equipped to help solve all kinds of tubing problems.

Fill out the coupon below for more facts on Republic ELECTRUNITE Mechanical Tubing. Or call your nearest Republic district sales office.



NORGE REDUCED COSTS 16% on these parts for its new automatic washer by switching to Republic Cold Drawn Carbon Corrected Steel. A costly carburizing operation was eliminated. Machinability is better. Quality of the parts is improved. Carbon correction restores carbon lost during hot rolling right out to the edge of the bar. It is not necessary to buy bars oversize to allow for surface removal. Norge saves both metal and money.



YOU CAN CUT COSTS BY REDUCING WEIGHT. And one of the best ways to do it is with Republic Commercially Pure Titanium or a Republic Titanium Alloy. With this new wonder metal, your product or equipment can weigh only 56 per cent as much as steel, and be just as strong—or stronger. The same operations which can be performed on steel can be done on Titanium. Here's a Titanium forging that's been threaded, milled, turned, drilled, tapped and honed.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

To buy from an *authorized* SKF Distributor is to get extra values that cost you nothing . . .

The advice, when needed, of men who have and are taking SKF's courses in bearing selection, installation, and maintenance.

The use of SKF sound slide films and literature to train your own men on ball and roller bearings.

Prompt delivery of *any* SKF Bearing or Pillow Block from your distributor, who is backed by a nearby SKF warehouse stock.

Special-problem assistance from SKF's Field and Home-office service-engineering staff—the most experienced in the industry.

7616

SKF®
BEARINGS AND PILLOW BLOCKS

The right bearing *from* the right place puts the right bearing *in* the right place.

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.,
manufacturers of* SKF *and* HESS-BRIGHT® *bearings.

New facilities mean...

BLISS-DIECO die sets now available in KING-SIZE too!

As a division of E. W. Bliss Company, we are able to use their virtually unlimited machining facilities for the production of "giant" die sets.

With these facilities we can produce the largest die sets in use today.

What is more important, however, is that Dieco takes the same pains with large die sets as with the small: holes are precisely bored, pins and bushings fitted and aligned with care, plates inspected to assure perfect parallelism. In short, all the underlying design principles of our famous "finger-tip action" die sets—designs which have won unqualified approval from diemakers—are now available to users of large, special die sets.

Whatever your die set problem—large or small, standard or special—a Dieco engineer will be glad to help you. Call him into your pressroom, let him demonstrate to you why and how Dieco die sets will mount easier, last longer under even the toughest of conditions.

Call your local Bliss representative today!

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1400 Brookpark Rd.
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DETROIT, MICH.
20201 Sherwood Ave.
FOrest 6-2480

DAYTON, OHIO
311 Vermont Ave.
MI 9691

BUFFALO, N. Y.
440 Terrace Blvd., Depew, N. Y.
REgent 6767-8

PITTSBURGH, PA.
122 S. Sheridan Ave.
EMerson 1-0440

SAN JOSE, CALIF.
7th & Commercial Sts.
CYpress 7-4114

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Distributors in midwest, far west and south

Write for Bulletin No. 71

BLISS
SINCE 1857

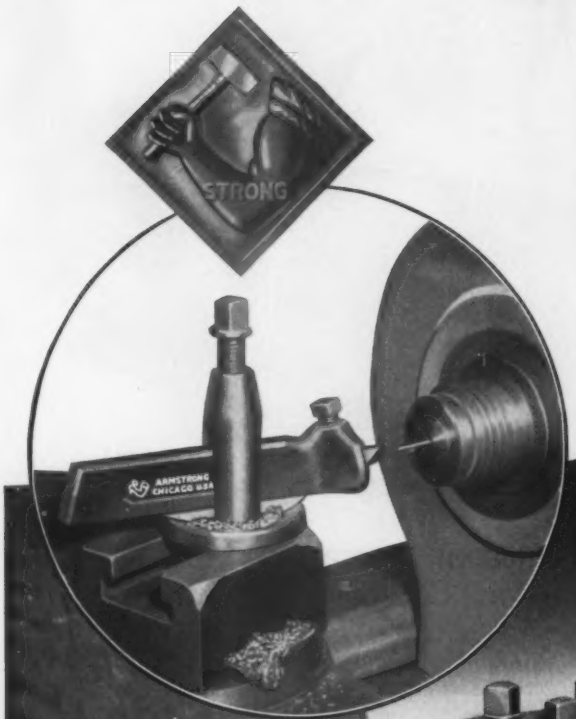
E. W. BLISS COMPANY
DIE SUPPLY DIVISION
1400 Brookpark Road, Cleveland, Ohio

DIECO

Industry's most complete line of die sets and die makers supplies

DIE SETS · GUIDE PINS · BUSHINGS · SPRINGS · SOCKET HEAD SCREWS · 5001 ITEMS

ARMSTRONG
TOOL HOLDERS...
for every operation!



There are ARMSTRONG TOOL Holders in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5215 W. Armstrong Ave. Chicago 30, Ill.

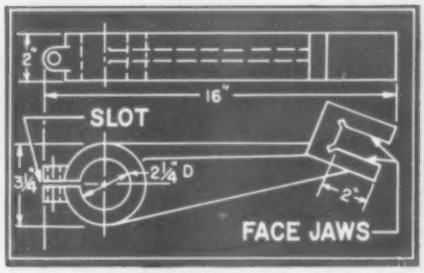
Production Band Machining Saves up to 50% and More over Other Methods . . .

Slotting . . . splitting . . . notching . . . cutting grinding reliefs . . . contour cutting . . . angle cutting—are a few of the production line operations formerly done with milling machines, shapers, planers and lathes, which are now being done in a fraction of the time at far less cost with the new DoALL power-feed Contour-matic Band Machines. Just look at the savings that resulted on the jobs shown on the next page.

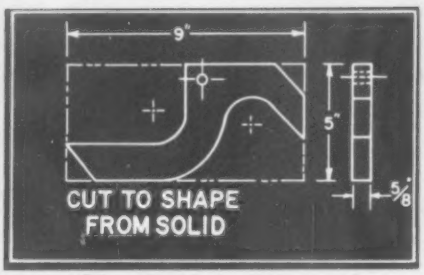
DoALL

The DoALL Company
Des Plaines, Illinois

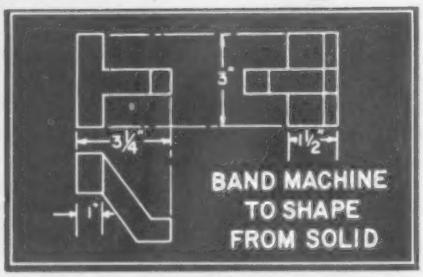
Typical Jobs Done Faster at Lower Cost by DoALL Production Band Machining!



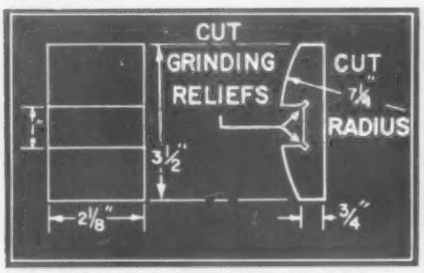
53% TIME SAVING in cutting .100" slot and facing two 2" x 2" cast jaws. 150 pieces formerly milled in 13.15 hours; now band machined in 6.25 hours.



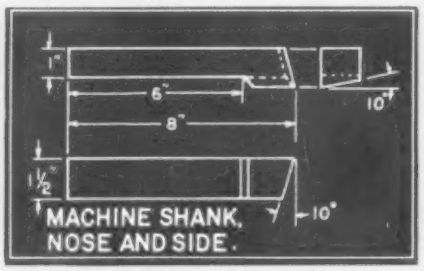
19% TIME SAVING cutting 175 levers from plate. Formerly torch cut and ground in 29.22 hours; now band machined in 23.62 hours with no grinding required.



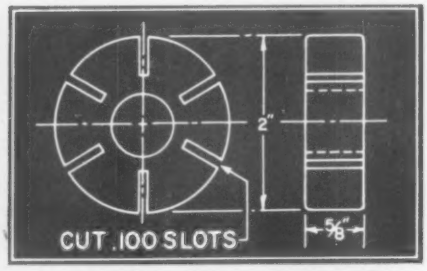
46.28 HOURS SAVED cutting mounting bracket from solid. 75 pieces formerly shaped in 60.0 hours; now band machined in 13.72 hours—77% time saving.



56% TIME SAVING in machining radius and grinding reliefs. 50 pieces formerly milled in 3.10 hours; now band machined in 1.35 hours.



58 HOURS SAVED machining tool shank nose and side. 500 pieces formerly produced in 99.5 hours; now band machined in 41.5 hours.



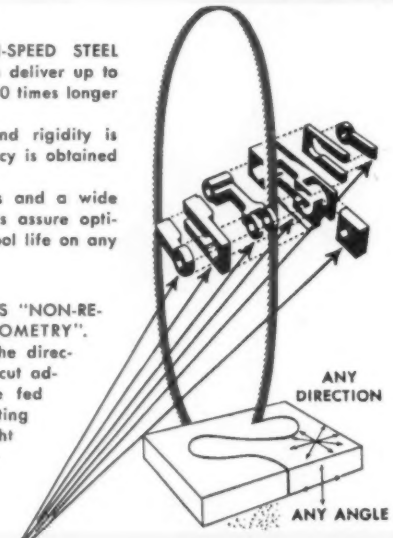
48 HOURS SAVED cutting .100 x .4375 slots in rotors. 2000 formerly milled in 66.6 hours; now band machined in 18.6 hours—72% less time.

NEW DoALL DEMON HIGH-SPEED STEEL SAW BANDS are available to deliver up to 6 times faster cutting, up to 10 times longer life than carbon steel blades.

Greater machine power and rigidity is now provided. Highest accuracy is obtained —cuts are square and true.

Variable speeds and feeds and a wide range of different band tools assure optimum production, finish and tool life on any machinable material.

THE BAND MACHINE PERMITS "NON-RESTRICTED MACHINING GEOMETRY". There are no restrictions to the direction of cutting action as the cut advances. Hence, work may be fed to the narrow, continuous-cutting band tool along either a straight or "contoured" course. And unwanted material is "sliced off" in whole sections.



New DoALL Contour-matic band machines have opened up an entirely new machining concept. An automatic hydraulic power feed table carries the work into the thin continuous-cutting band tool. Integral recirculating coolant system and air jet promote high cutting rates and long tool life. Cutting forces hold the work down to the table—only the simplest fixtures are required. Tooling cost is far less than for other machine tools. Setup and floor to floor time is greatly reduced.

Faster cutting...lower tooling cost...lower capital investment (a DoALL power feed band machine costs but ⅕ to ½ as much as production milling machines, shapers or planers) — these are the money-saving advantages of DoALL *production band machining*. For complete details call your local DoALL Store—see classified listing in your phone book—or write THE DoALL COMPANY.

NEW FILM "Production Band Machining" now available showing operation of this new machining concept.

ASK FOR FREE DEMONSTRATION at your plant. There is absolutely no obligation—a DoALL Demonstration Unit will pull up in your "back yard" and show you production band machining in action.

EDUCATIONAL STUDY WALL CHARTS
Economic Principles
$1.00 each postpaid
Lower quantity prices.

Call Your DoALL Service-Store
DoALL SAW BANDS
DoALL GAGE BLOCKS
DoALL GRANITE PLATES
Machine Tools • Cutting Tools • Measuring Instruments
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The DoALL Company, Des Plaines, Ill.

Friendly DoALL Stores... (in 40 cities)

Personalized Service...Complete Stocks...Local Delivery

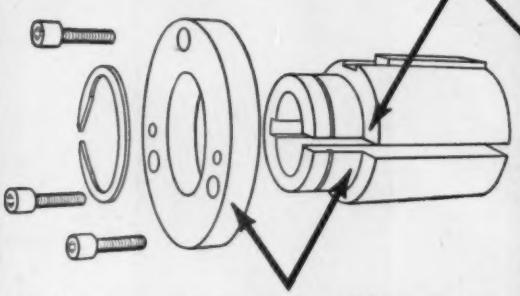
Get the ONLY SHEAVE with ALL these needed features

TEXROPE Sheaves with MAGIC-GRIP Bushings

Full-length bushing key for uniform torque transmission along entire bushing.

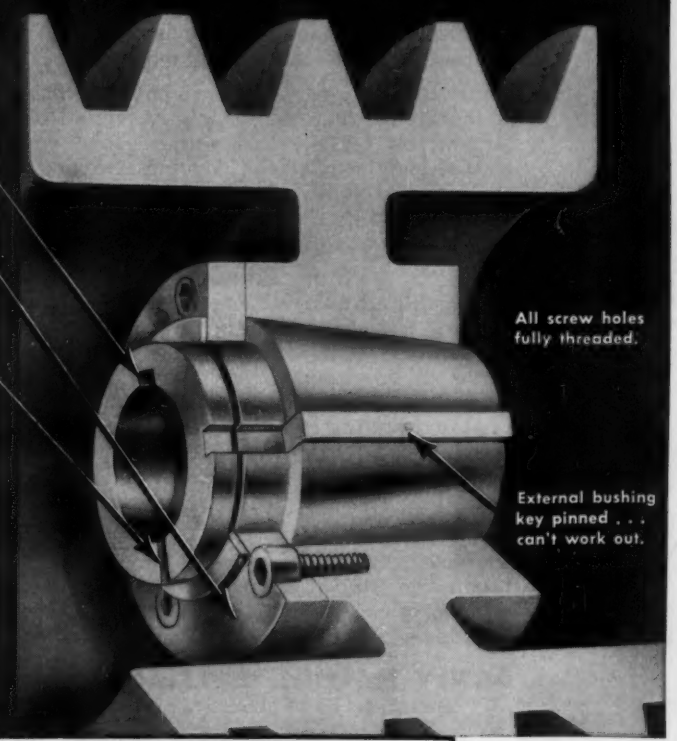
Floating collar allows cap screws to draw sheave on taper of bushing without binding — collar takes no torque.

Full-length split and uniform section provide uniform grip over entire contact surfaces.



No torque carried by screws as all torque is transmitted through keys.

Two-piece bushing (cast-iron sleeve and free-floating collar).



Here's Comparison of *Magic-Grip* Sheave and Other Sheaves

	Magic-Grip Sheave	Sheave A	Sheave B	Sheave C
Bushing fully split and uniform in section for full-length, full-circumference grip.	Yes	Yes	No	Yes
Torque carried by keys instead of threaded bolts.	Yes	No	No	No
All screws engage all threads fully.	Yes	Yes	Yes	No
Mounts in one piece.	Yes	No	Yes	Yes

See Your Allis-Chalmers District Office or Authorized Distributor

Texrope and *Magic-Grip* are Allis-Chalmers trademarks. A-4553

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

wanted: more

Management men are discovering the tremendous production gains and cost savings that result from uninterrupted operation of an entire stamping line. Since Danly Presses offer *maximum freedom from mechanical failure,* lines composed entirely of Danly Presses can produce more finished stampings per shift without work stoppage, without high maintenance costs in time and labor.

Danly Press lines actually turn out more finished stampings per hour, too. Danly Drawing Presses, pace-setters for the line, are designed with a special slide motion that doubles stroking rate without exceeding safe drawing speed. Output from these Danly Drawing Presses keeps the whole line working at full capacity.

Now—why are Danly Presses able to provide such remarkable advantages? For the most part, it's due to Danly's special design and heavier construction. Pressurized *oil* lubrication reduces maintenance by hundreds of hours every year. Heavier, more rugged construction meets day in and day out peak-load requirements. Danly's cool-running clutch and brake wear less . . . run longer before replacement. Simplified electrical and pneumatic control devices increase both operator and machine safety.

Because press downtime losses affect *your* entire production setup, it will pay to have a Danly Press engineer give you the complete story on how to lick this problem. Write or phone today.

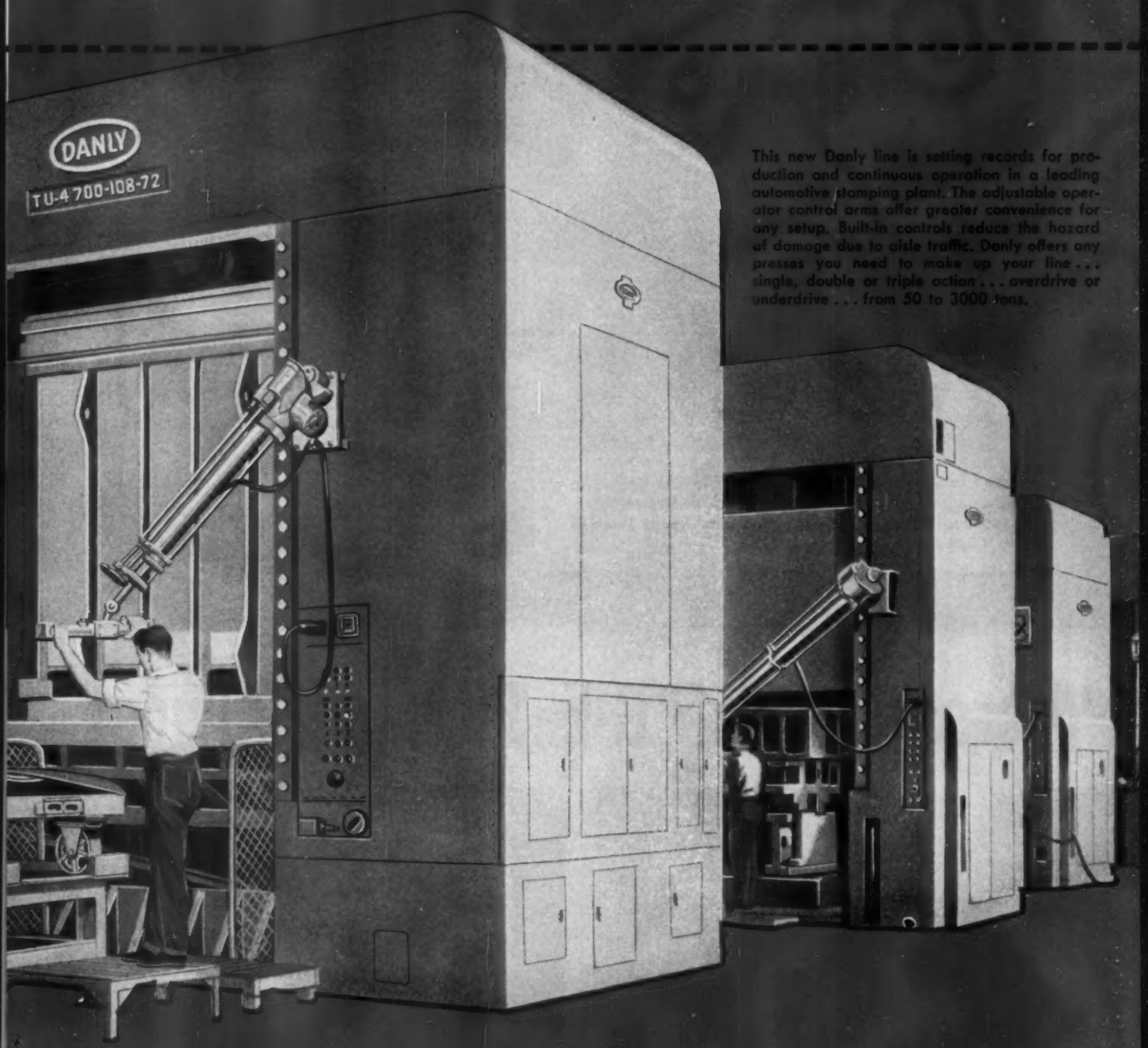
DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

DANLY®
HYDRAULIC METALWORKING EQUIPMENT
MECHANICAL PRESSES . . . 50 TO 3000 TONS

It costs less to run a DANLY PRESS line!

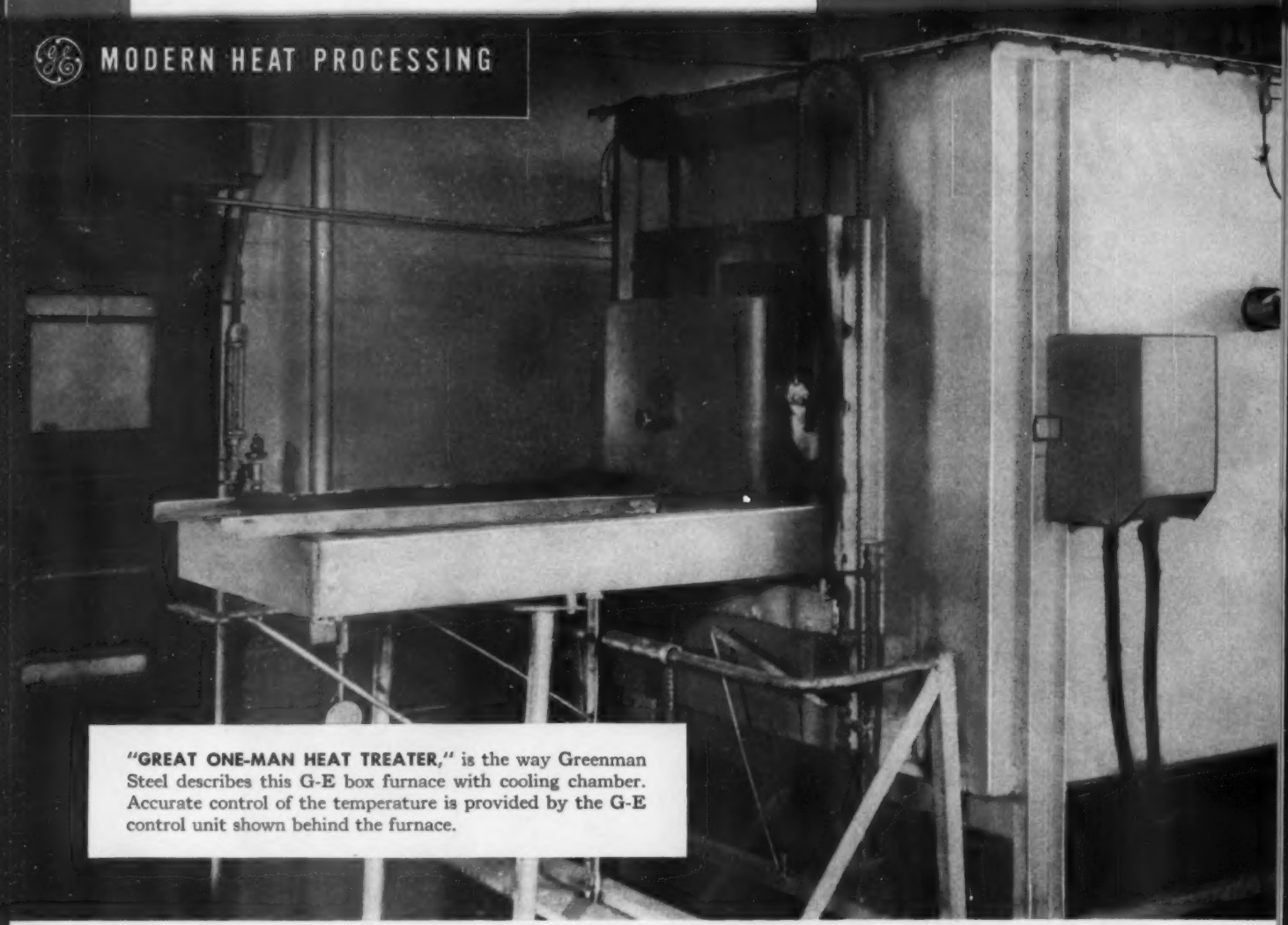
specify: A NEW

finished stampings per shift



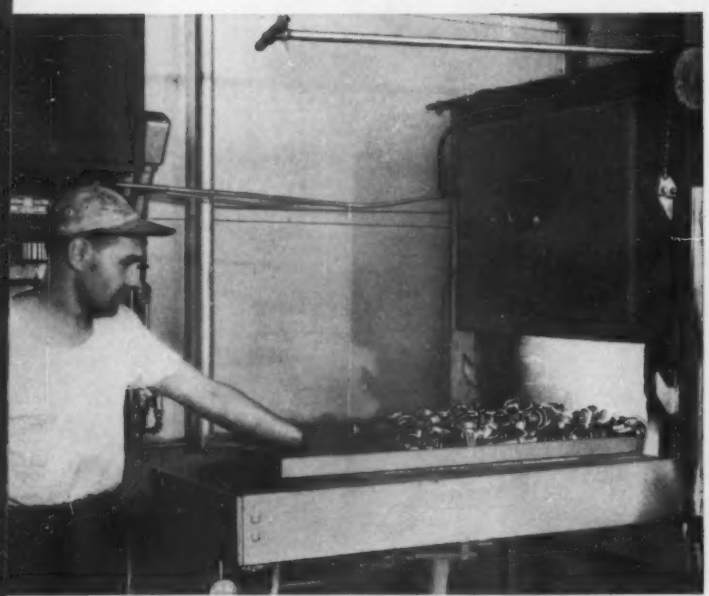
This new Danly line is setting records for production and continuous operation in a leading automotive stamping plant. The adjustable operator control arms offer greater convenience for any setup. Built-in controls reduce the hazard of damage due to aisle traffic. Danly offers any presses you need to make up your line . . . single, double or triple action . . . overdrive or underdrive . . . from 50 to 3000 tons.

DANLY PRESS LINE



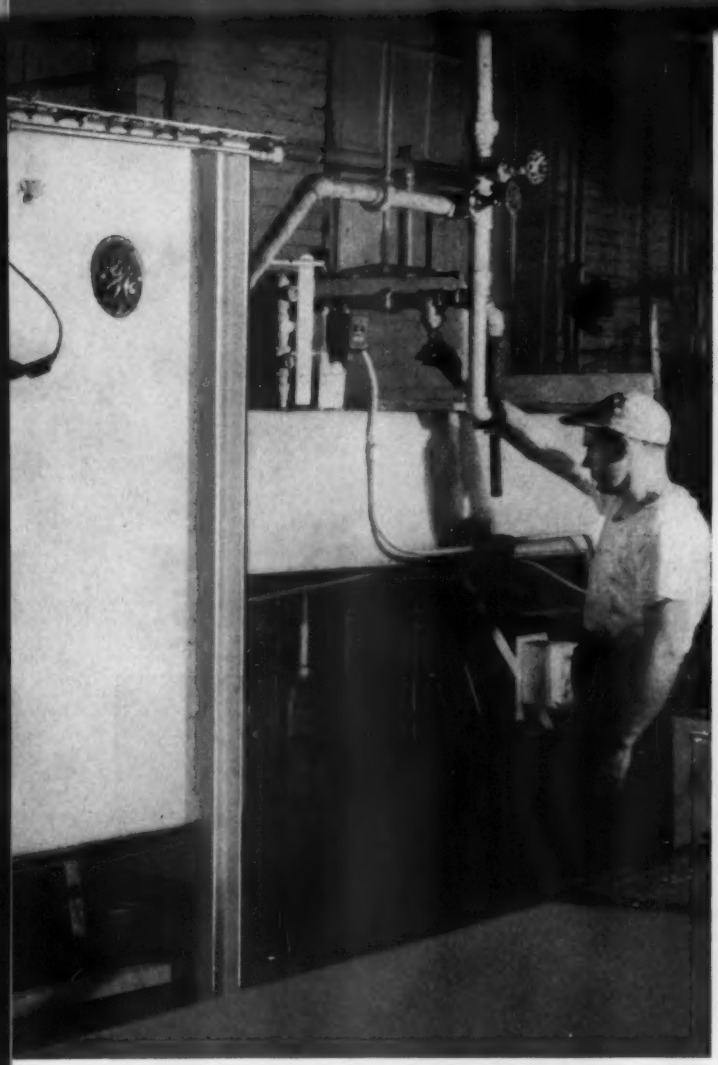
"GREAT ONE-MAN HEAT TREATER," is the way Greenman Steel describes this G-E box furnace with cooling chamber. Accurate control of the temperature is provided by the G-E control unit shown behind the furnace.

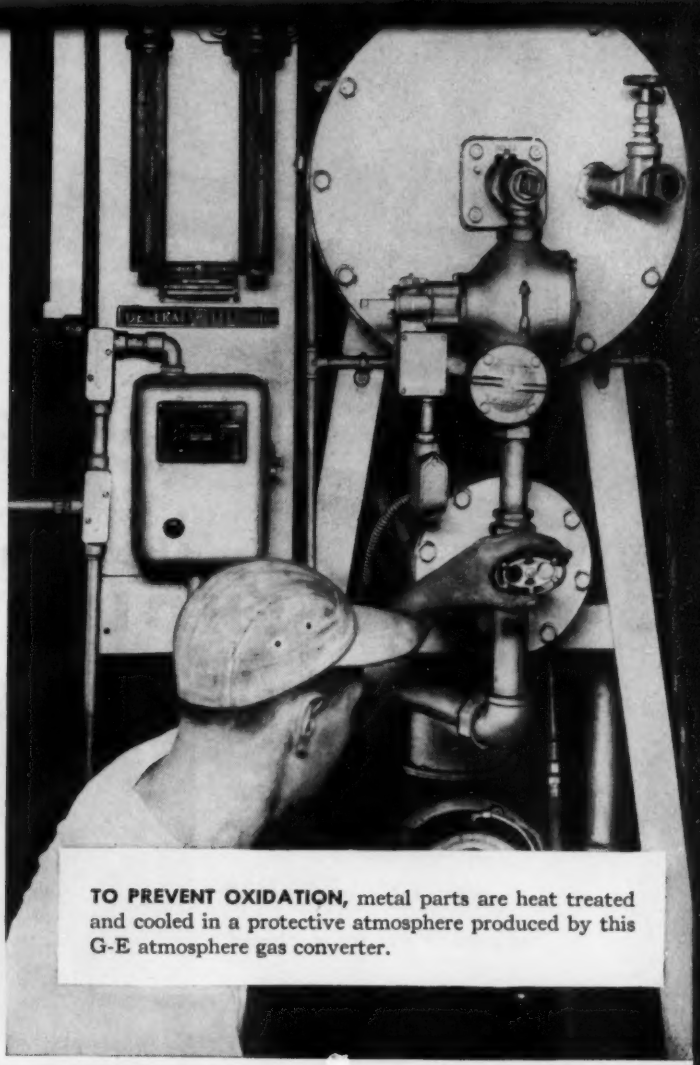
"Versatility of G-E Furnace Almost



MANY HEAT-TREATING JOBS can be done with this one G-E box furnace. Greenman Steel uses it for copper brazing, silver brazing, annealing, and hardening. Here, the furnace is employed to anneal drawn-steel cups.

HIGH-QUALITY WORK is achieved by moving the parts directly from the furnace to the atmosphere cooling chamber, thereby minimizing oxidation. Here, the parts emerge from the cooling chamber clean and bright.





TO PREVENT OXIDATION, metal parts are heat treated and cooled in a protective atmosphere produced by this G-E atmosphere gas converter.

Unlimited," Says Industrial Heat Treater

Operational savings of G-E furnace keep Greenman Steel competitive

Heat-treating jobbers who demand versatility in a furnace find that General Electric's box furnace with water-jacketed cooling chamber is ideal for general-purpose work.

Says Lloyd G. Field, General Manager of Greenman Steel Treating Corp., Worcester, Mass.:

"As a heat-treating jobber, we have to produce high-quality work at lower cost than equipment manufacturers can do it themselves. We must be ready to handle all sorts of heat-treating jobs, yet our investment in equipment must be kept to a minimum. We find that our G-E box furnace satisfies all these requirements. It enables us to stay competitive because it produces superior work at low cost. It minimizes our equipment costs because its versatility is practically unlimited. We use it to copper braze, silver braze, anneal, and harden."

MANY SAVINGS, HIGH-QUALITY WORK

Mr. Field pointed out that operating costs are low because the insulating qualities of the furnace minimize heat loss. Automatic control of the heat assures him of high-quality work.

FOR APPLICATION HELP

Whether your operation demands a small-capacity, all-purpose furnace, or one that is engineered for a particular process and intended for high-production rates at the lowest possible cost, General Electric can satisfy your requirements. For application help from a G-E Heating Specialist, contact your G-E Apparatus Sales Office.

GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN HEAT PROCESSING BULLETINS

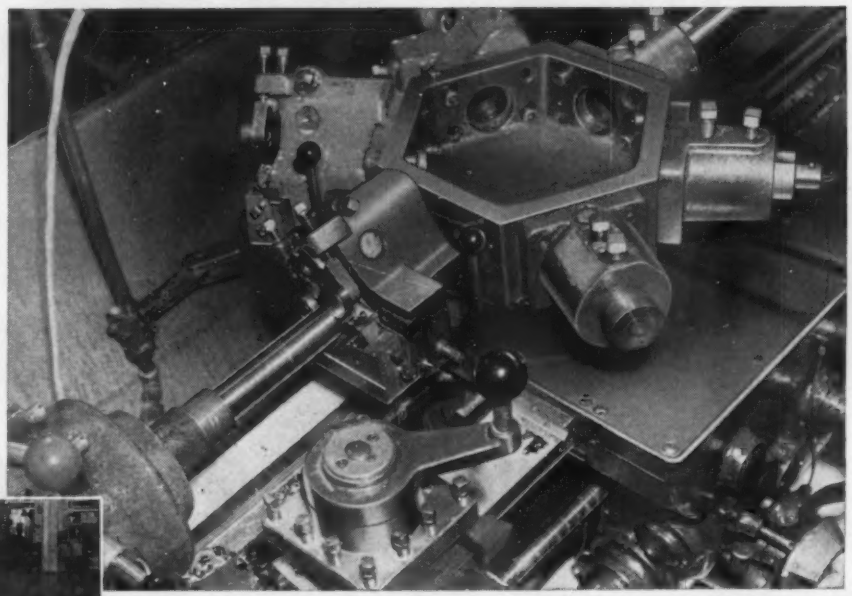
- Furnace and Induction Brazing, GEA-5889
- Heat-treating Aluminum, GEA-5912
- Annealing Malleable Iron, GEA-5797
- Protective Atmosphere, GEA-5907
- Forging with Induction Heat, GEA-5983
- Wire Enameling, GEA-6179

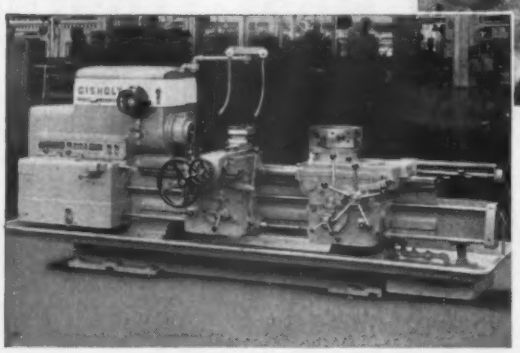
Address: General Electric Co., Section 720-129, Schenectady 5, N. Y.

take shaft jobs Like This:

they take less time on GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

MADISON 10, WISCONSIN

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Address: General Electric Co., Section 720-129, Schenectady 5, N. Y.

5+4 = 100%

An Announcement of Special Interest to All Metal Cutting Plants by the Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.

We are pleased to announce that the addition of four new members to the Cimcool® family of five products now permits us to serve industry 100%.

As you know, it was just a few years ago that we introduced our first cutting fluid, Cimcool Standard Concentrate. Born of 25 years of painstaking research and practical experience, this revolutionary coolant is today the largest selling chemical-lubricant cutting fluid in the world.

In recent years we have added four other products, each one uniquely designed to serve a special purpose in industry: Cimcool Water Conditioner for increased rust control . . . Cimcool Tapping Compound, the magic compound that increases tap life . . . Cimcool S-2 Concentrate for heavy duty use . . . and Cimcool Transparent Grinding Fluid, developed for superior rust control at high dilutions.

These original five members of the Cimcool family served 85% of all metal cutting jobs. However, our goal has not been 85%, but *one hundred per cent*. And now, we have at last reached that goal with the introduction of four *new* products—which also have been developed in the laboratory and proved on-the-job:

CIMCUT BASE ADDITIVE—For those jobs where an oil-base cutting fluid is required.
CIMCOOL "CI"—The cutting fluid for cast iron with exceptional rust control properties.
CIMCOOL MACHINE CLEANER—2-phase non-corrosive cleaner that cuts grit, dirt, slime, oil.
CIMCOOL BACTERICIDE—The most effective agent yet developed to overcome rancidity.

Our representatives will be happy to give you full details about these nine great products now serving industry 100% . . . and to prove to you, through actual demonstration, that Cimcool products *lower costs . . . and do a better job.*

®Trade Mark Reg. U.S. Pat. Off.

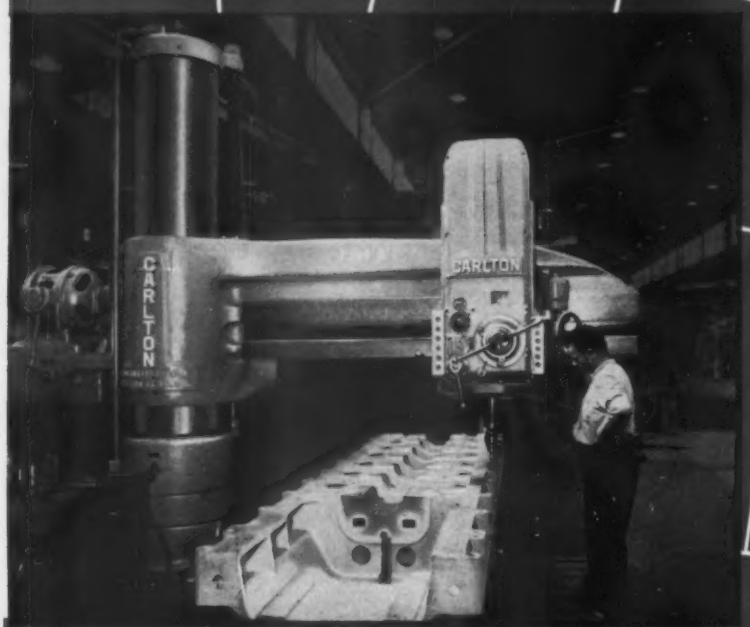
CIMCOOL
Cutting Fluids

100% for ~~85%~~ of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

Carlton

cuts drilling costs

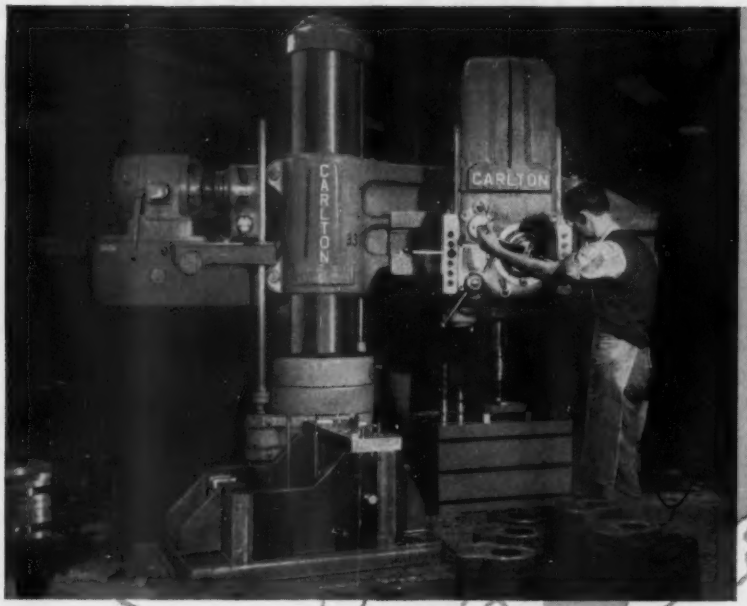


WEST

The huge Carlton 5A radial drill at Enterprise Division, General Metals Corp., San Francisco, can drill heavy work like this . . . yet can be used with equal success for smaller, more sensitive requirements.

SOUTH

National Supply Co., uses this Carlton 4A radial drill in their new Gainesville, Texas plant for drilling structural members of oil field pumping units.



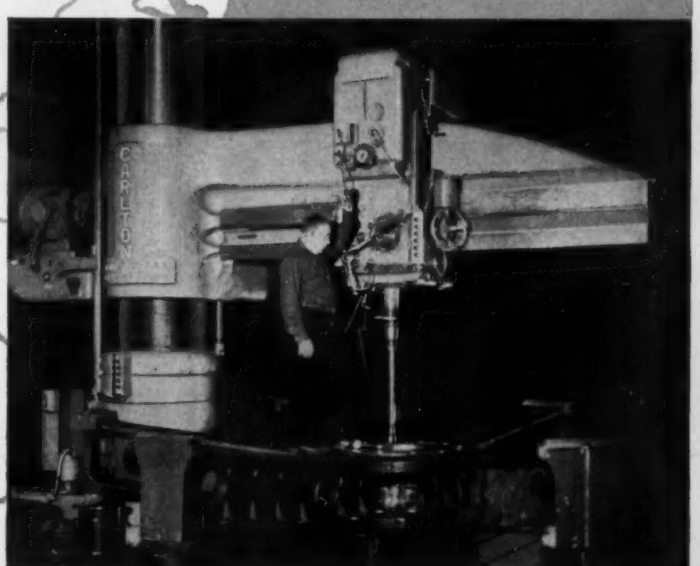
NORTH Carlton 3A radial drill machining a cam used on an automatic concrete block machine manufactured by the Besser Co., Alpena, Mich. Precision, rigidity and pushbutton control make Carlton first choice at Besser Co.

all over the U. S.

Carlton radial drills available in arm lengths from 3-ft. to 12-ft., and column diameters from 9" to 26". Carlton horizontal drills made in 4H and 5H sizes. For complete information, call your machine tool distributor, see the Carlton brochure in Sweets' Machine Tool Catalog file, or write The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Carlton can cut your drilling costs, too . . . **in three ways: (1) Because Carlton can handle a broader range of work (¼" to 10" diameter holes on the 19" column 4A, for example), you need less drilling equipment. (2) With Carlton accuracy you drill it right the first time—there's no lost motion. (3) And with the help of Carlton engineered tooling, you can be sure of higher drilling rates. Why not write us today and get the 'hole' story? The Carlton Machine Tool Co., Cincinnati 25, Ohio.**

"THE HOLE STORY" gives complete information and specifications on Carlton OA, 1A, 3A, 4A and 5A radial drills. Write for your copy . . . please specify size desired.

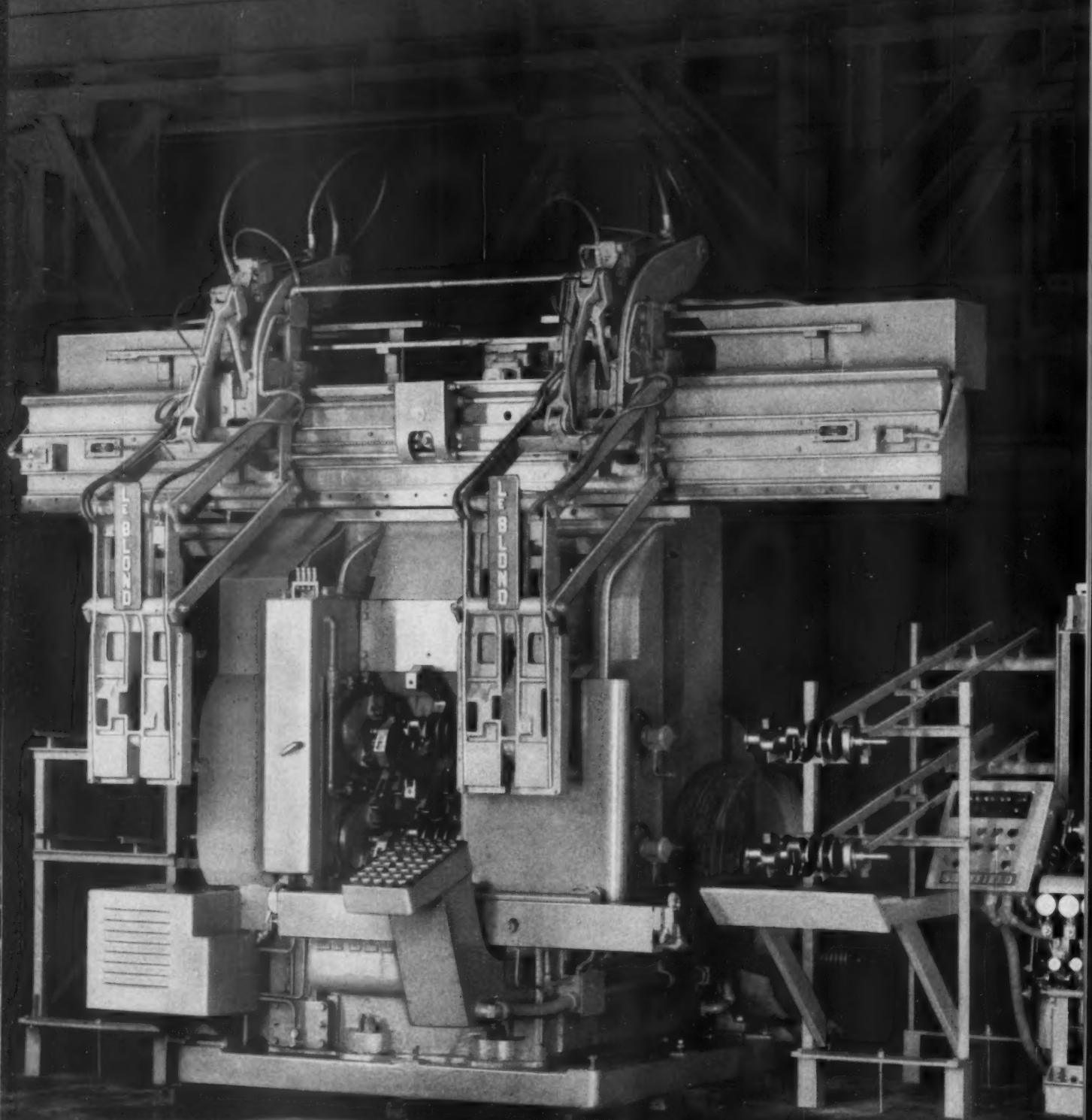


EAST Westinghouse Electric Corp., East Pittsburgh, selected this Carlton 5A radial because of its enormous capacity. The Carlton honing attachment shown provides uniformity of hole size to within 1 micro-inch.

Carlton
Horizontal and radial drills

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

FASTEST CRANKSHAFT LATHES



THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 8-17, 1955
INTERNATIONAL EXPOSITION

Crankshafts travel from right to left. The LeBlond LBA turns main bearings, flange and pilot, sprocket diameter and front end simultaneously. The automatic loader-unloader then delivers the crank to a gaging fixture where diameters of the No. 1, 3 and 5 main bearings are checked. The crankshaft is transferred to the LeBlond PBA where all the pin bearings of two cranks are turned at the same time. Note: Loading racks shown are temporary for runoff only.

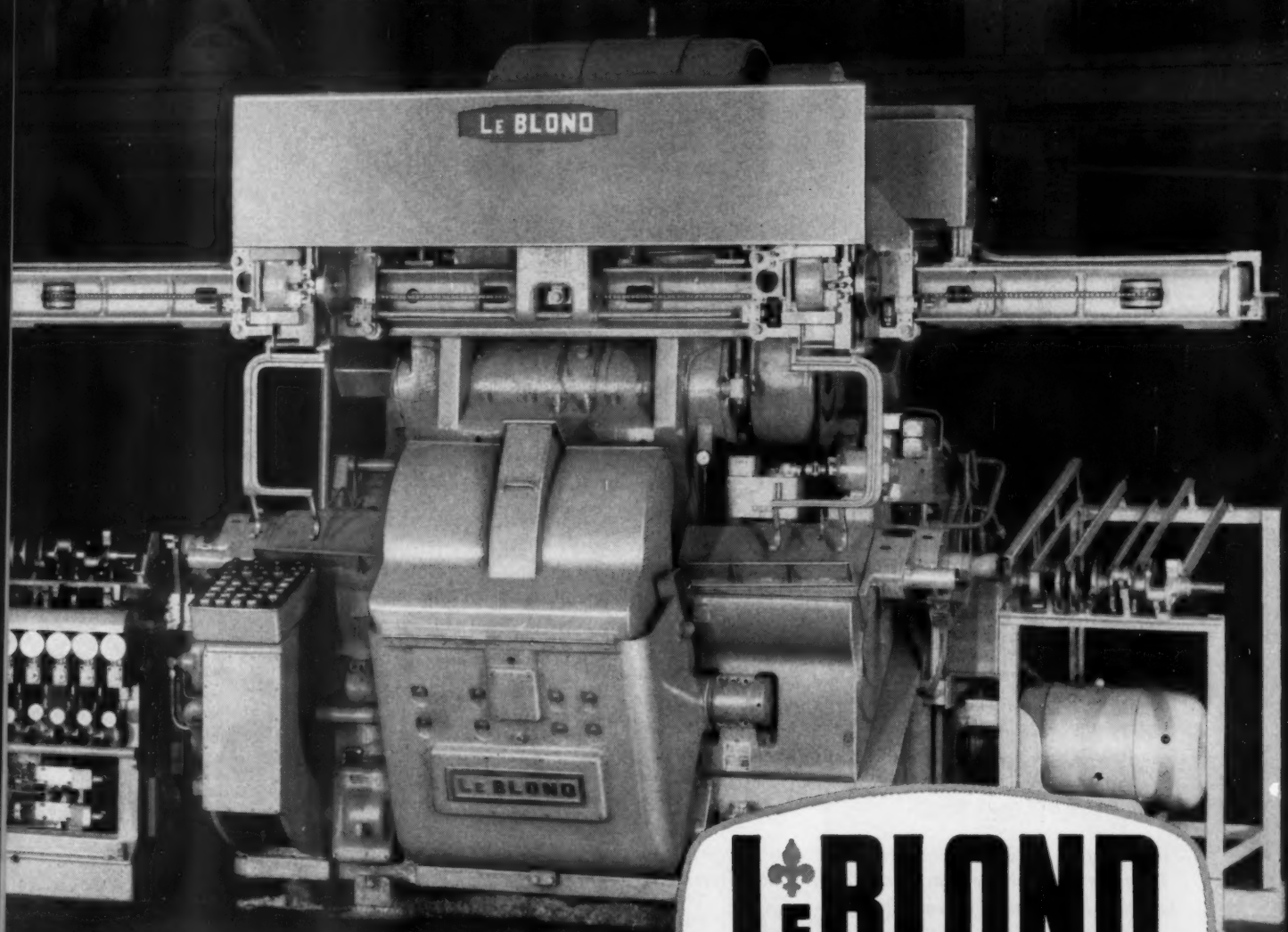
ANNOUNCED BY LeBLOND

Fifty-five precision-cast V-8 crankshafts per hour—highest production yet—are turned out by the latest LeBlond Automated Crank Turning Equipment.

The new unit consists of a LeBlond Automatic Line Bearing Center-Drive Lathe, a gaging fixture and a LeBlond Automatic Two-Spindle Pin Turning Machine. One operator can handle two such units. All turning and facing operations are completed on the crankshafts which have been prepared by spot milling and centering. Machine motions are sequenced electrically and hydraulically for continuous automatic operation.

You can benefit from LeBlond's experience as *the* pioneer of crankshaft-turning equipment over more than a half-century. Send us your crank-turning specifications for quotation.

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO



....cut with confidence

LeBLOND of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES — FOR MORE THAN 67 YEARS.

gaging fixture where diameters of the No. 1, 3 and

for runoff only.

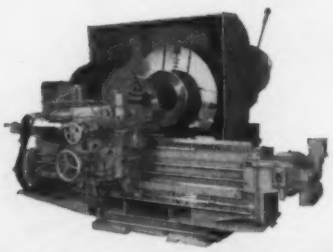
There's only one T lathe

...designed and perfected by Lodge & Shipley for ANY thin-wall, short length, large diameter work

Now used by scores of manufacturers in several countries, Lodge & Shipley T Lathes are setting notable records for productivity, accuracy and versatility. Particularly in the manufacture of jet engine parts and in other industry, T Lathes are solving the problem of facing, turning and boring thin-wall section work of large diameter and short length.

Far faster, more sensitive and much more accessible, T Lathes are more compact, cost far less than oversize lathes or boring mills formerly used.

Like other manufacturers in many industries, you may find good profit possibilities in a Lodge & Shipley T Lathe. Write for Bulletin 215. The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.



Illustrated is the type O, the most universal single carriage type T lathe. Other types available with single or double carriages and with various Copymatic tracer control arrangements.

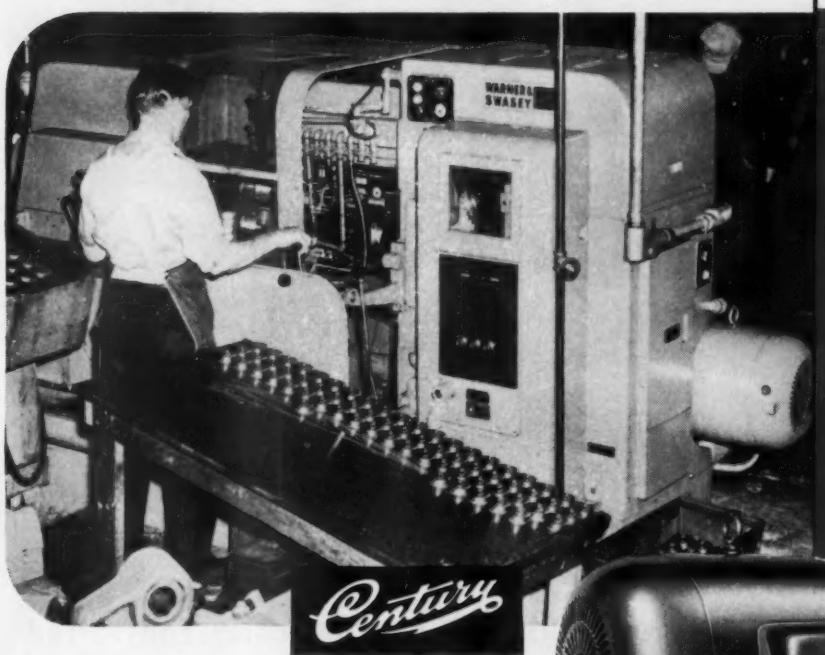
Lodge & Shipley

....your LODGE-*ical choice!*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES — FOR MORE THAN 50 YEARS

Century

JOB MATCHED MOTOR . . . helps get



PRODUCTION OUT FAST . . .

ON 5-SPINDLE AUTOMATIC CHUCKING MACHINE

Performance Rated® MOTORS

Type TEFC, Totally Enclosed Fan Cooled Motor — protects against dust, mist, oil fog and fumes.

The Century Motor was selected with the proper torques — speed — adaptable mounting—frame protection for oil fume atmosphere. All the factors were Performance Rated to functionally match this specific application.

Century Motors are widely known in the metal working industry for their mechanical precision and unusual freedom from vibration—matching the fine equipment they drive.

Century Performance Rating is available to you because of the wide range of specifications from which to select. Motors are offered in A. C. or D. C.—⅛ to 400 H.P.—constant speed or speed control in fine steps.

Specify Century **Performance Rated** MOTORS for your equipment. Call a Century District Sales Office or your nearest Century Authorized Distributor.

CENTURY ELECTRIC COMPANY

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Offices and Stock Points in Principal Cities

Century C MOTORS

836

Presenting the "E"

...a heavier, huskier, hydraulically controlled CRI-DAN

It's Here—At *Your* Request. Yes, the tremendous acceptance of Cri-Dan "B" and Cri-Dan "D" has resulted in the development of a larger, heavier precision threading machine greatly extending the range of the Cri-Dan Single Point Threading Method. Not only precision threading but secondary turning, boring, facing and chamfering facilities are incorporated in the Cri-Dan E; complete hydraulic and electric controls assure maximum efficiency even on the heaviest applications. A quick check of the specifications will show the ruggedness and range of this, the newest and finest Cri-Dan Single Point High Speed Threading Machine ever developed. Write The Lees-Bradner Company, Cri-Dan Division for specific information on the processing of your parts.

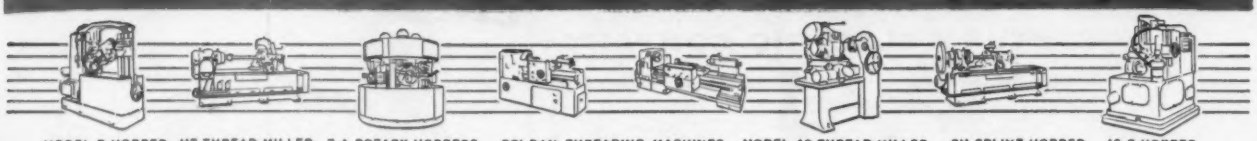
SPECIFICATIONS

Threading Range	2 TPI-48 TPI	Max. Taper of Thds.	15° Included
Max. Thd. Dia. (Internal)	16" Dia.	Multi-Start Threads	Yes
Max. Thd. Dia. (External)	12" Dia.	Spindle Speeds	50-1400 RPM
Max. Swing Over Ways	25" Dia.	Main Motor	20 H.P.
Max. Swing Over Tool Slide	12" Dia.	Floor Space Req'd	5'6" x 14'0"
Max. Thread Length	6½"	Approx. Weight	4½ Tons
Length Between Centers	2'6", 5'6" & 8'6"		

CRI-DAN DIVISION

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.



MODEL R HOBBER · HT THREAD MILLER · 7-A ROTARY HOBBERS · CRI-DAN THREADING MACHINES · MODEL 40 THREAD MILLER · SH SPLINE HOBBER · 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

Mechanical Tubing?

Take your choice from 531 sizes— we have them all!

We are *really* stocked to serve your every tubing need . . . with dependable Shelby Seamless Mechanical Tubing in the standard 531 sizes for you to choose from! We can furnish your entire tubular requirements from either warehouse or mill.

Such wide selection offers you greatest freedom of design for it means that you can always get *exactly* what you want from us—and without delay. Then, too, on your warehouse requirements you save the time, money and space that would be required in keeping an adequate tubing inventory of your own.

When you want technical assistance, we can be of great help, too. Our staff has experience with problems similar to yours and can often recommend the proper analysis, condition or size of tubing for your needs.

May we serve *you?*

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Call U. S. STEEL SUPPLY for ALL your steel needs...

- Structural Shapes
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Here's an authoritative "text book" on mechanical tubing — "Shelby Seamless Steel Mechanical Tubing" —that you'll turn to again and again for reference. It's a handy 5" x 7" size, 115 pages and fully indexed. Includes tolerances, machining allowances, physical properties and other important data. Send the coupon for your *free* copy.

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Gentlemen:
Please send me, without charge, the Shelby Mechanical Tubing Book.

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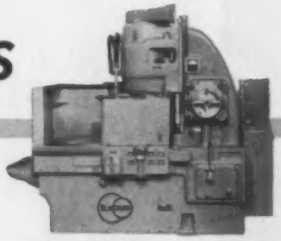
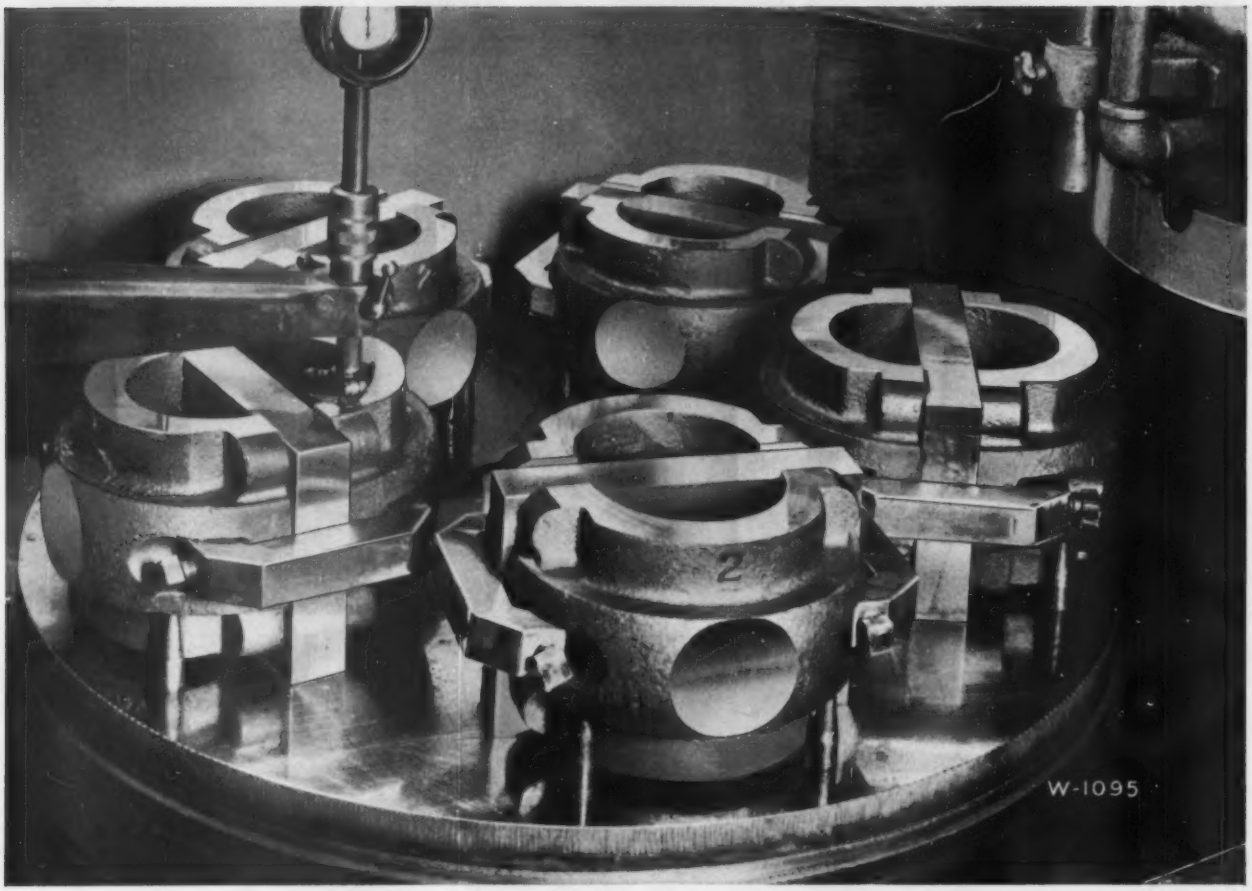
IT PAYS



TO PUT IT ON A BLANCHARD



The first operation on these cast steel (1504) bearings is to Blanchard grind the parting line to establish locating surfaces.

Then, a No. 18 Blanchard Surface Grinder (shown above), with 36" magnetic chuck, rough grinds the end faces of all five sets in 17 minutes—at an abrasive cost of only 2¢ per piece! This operation provides locating surfaces for additional machining. By using the correct Blanchard wheel* and proper rate of down feed, the wheel dresses itself and removes three cubic inches of cast steel per minute.

The final Blanchard operations include finish grinding both end faces—removing .015" of stock from each end, flat and parallel to ±.001". Each surface is ground in 17 seconds, fourteen pieces to a load, located directly on the magnetic chuck.

**Blanchard Grinders perform best with Blanchard Wheels!*

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Company .....
Address .....

The man who needs a new machine tool and doesn't buy it is paying for it anyway...

in hidden tooling costs

THE difference between your costs and your competitors' may be hidden behind the production line. It's the cost of maintaining your tooling.

There's time lost for tool sharpening! Extra floor space for extra machines in the tool room! Skilled tool dressers! Chuck alignment and maintenance! Production lost for wheel dressing!

One answer to hidden tooling costs is Microhoning

Instead of bits to be sharpened and wheels to be dressed Microhoning uses self-aligning, self-dressing tools. Throughout their life Microhone abrasives make clean, uniform cuts.

Look behind the production line and you'll find that your hidden tooling expense may total more than the cost of the latest type of Microhoning equipment, which would assure you of increased output, uniform quality, consistent accuracy of dimension and a functional surface finish. In short, you are paying right now for the new machine tools you don't have.

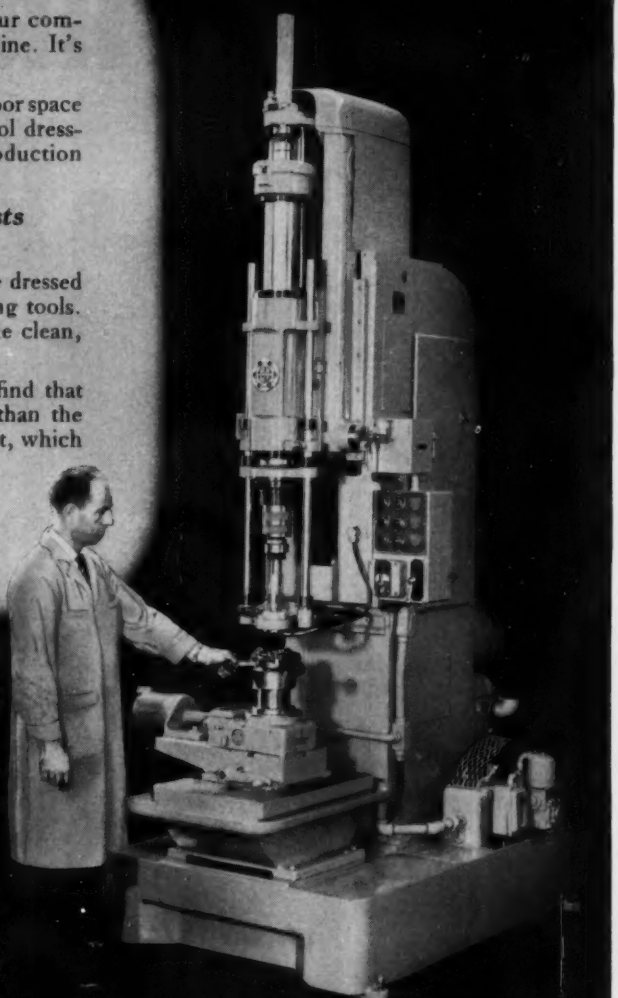
Surface: Spline in gear
Condition: Distorted by heat-treating

PROBLEM:

Excessive tooling cost—frequent changing and sharpening of tools—annealing of surface required—poor surface finish.

SOLUTION:

MICROHONING—Tool self sharpening—annealing not necessary—clean, consistent surface finish generated.



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REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Ave., Portland 4, Oregon
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Hydraulic controls
Diesel fuel injection equipment

PRECISION PRODUCTION THROUGH MICROHONING
MICRO MATIC

REED RTD Co

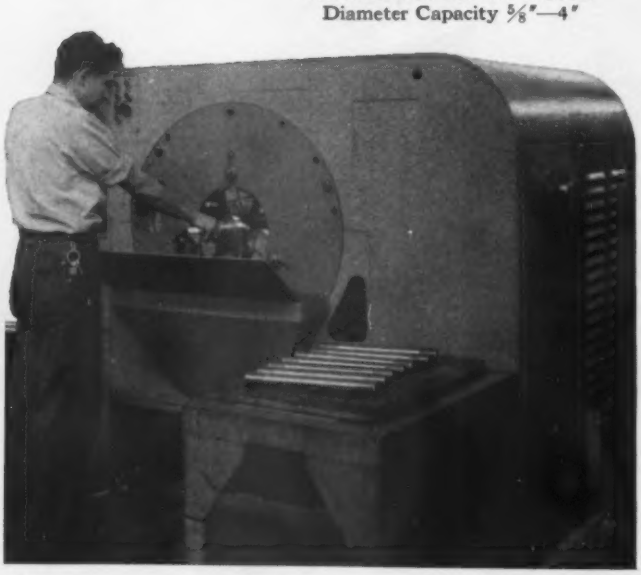
FIRST IN EQUIPMENT for

Precision THREAD ROLLING

A22 VERTICAL MODEL
Diameter Capacity
5/32"—2 5/8"

A23 HORIZONTAL MODEL
Diameter Capacity 5/32"—2 5/8"

A32-33-34 HORIZONTAL MODELS
Diameter Capacity 5/8"—4"



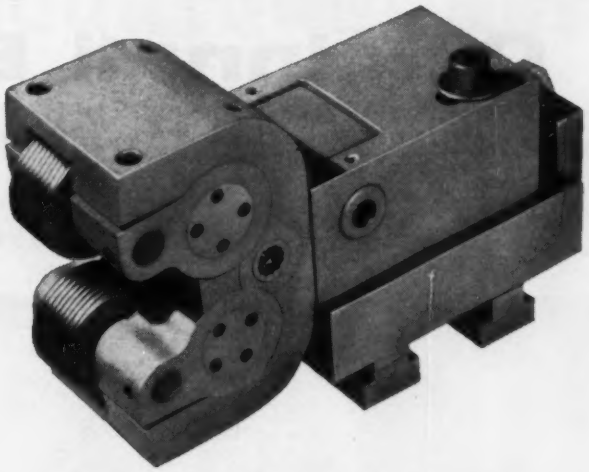
FIRST IN MACHINES

Over 600 Reed cylindrical die thread rolling machines are being used by the metalworking industry to produce a large variety of precision threads and forms faster, stronger and more economically. Backed by over 35 years of experience in thread rolling, these machines give you the desirable combination of accuracy and versatility. Class 5 thread tolerances can be easily maintained with a resulting superior surface finish. Reed machines are of rugged, compact construction. They are easy to set up, convenient and simple to operate and positive in operation. Equipped for either manual, semiautomatic or full automatic feeding, these machines are suitable for either small job lots or large production runs.

IF IT'S THREAD ROLLING .

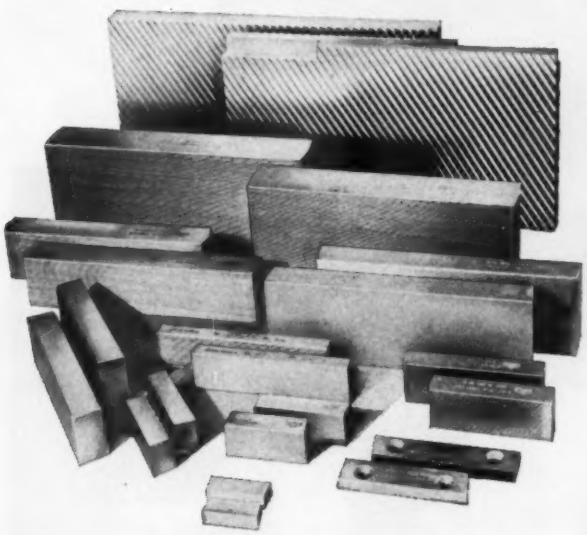
FIRST IN TOOLS

Reed precision thread rolling tools are manufactured to the highest standards of quality and are capable of rolling the most precise threads and forms. We have pioneered in the development of the thread rolling process and consequently are in a position to provide tools for rolling standard and special threads and forms. The uniform performance of Reed thread rolling tools coupled with their longer life, provide you with a means to make a better threaded product more economically.



REED Thread Rolling Attachments

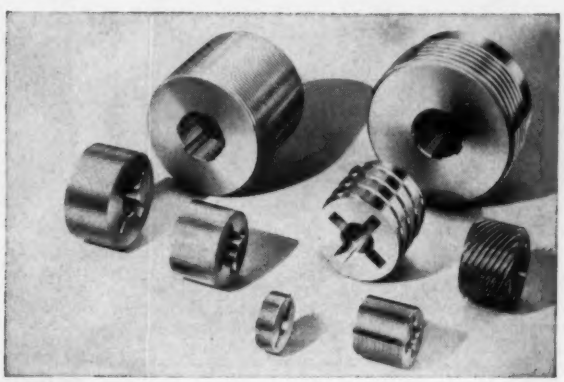
• Four Standard Heads adaptable to over 100 sizes of automatic Screw Machines • Special heads for special jobs • Rolls behind shoulders • Infinite range of work diameters within capacity.



REED Red Label Flat Dies for reciprocating type machines

Widely used for rolling Unified and American Standard threads, tapping screws, lag screws, knurling and other forms.

Complete stocks of common thread sizes for immediate delivery. Special dies for special threads and forms made to order.



REED Cylindrical Dies and Thread Rolls

• Stock of common thread sizes available • Special dies and rolls made to order • Supplied for any type of thread rolling machine and thread roll holder.

REED
ROLLED THREAD DIE CO.
WORCESTER, MASSACHUSETTS
Pioneers in Thread Rolling

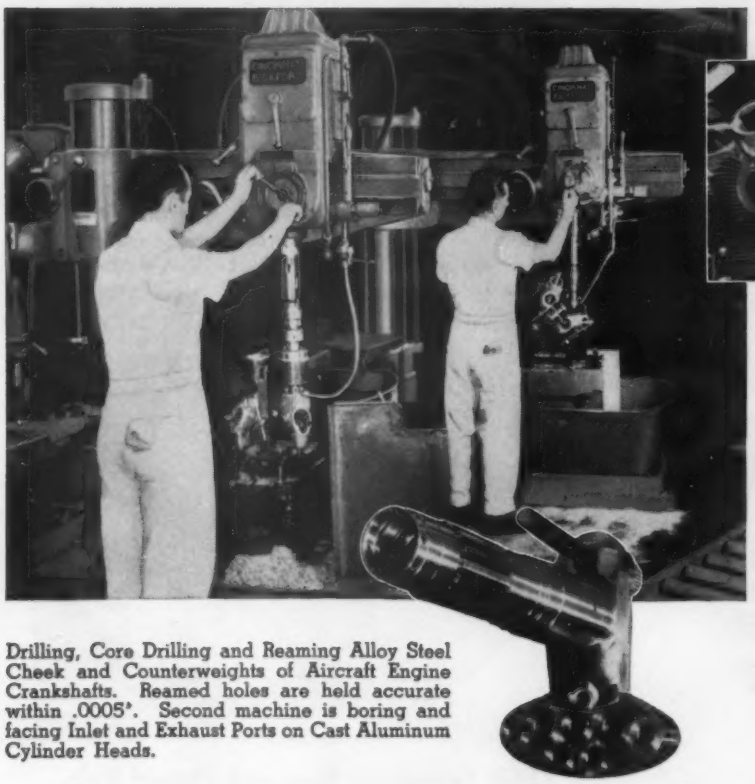
Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Denver, Detroit, Englewood, N. J., Houston, Indianapolis, Milwaukee, Montreal, New York City, Phila., Pittsburgh, St. Louis, Syracuse, Toronto

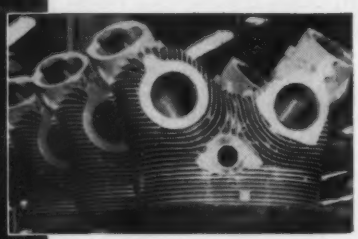
REED Knurls for Automatic Screw Machines and Turret Lathes

• Lapped finish provides outstanding performance and longer life • Precision manufacture insures uniformity of knurling • Over 100 different styles and sizes stocked for immediate delivery • Special knurls made to order.

. . . COME TO SPECIALISTS

Cincinnati Bickford MEETS ALL REQUIREMENTS AT Canadian Pratt & Whitney Aircraft Company LIMITED





Drilling, Core Drilling and Reaming Alloy Steel Cheek and Counterweights of Aircraft Engine Crankshafts. Reamed holes are held accurate within .0005". Second machine is boring and facing Inlet and Exhaust Ports on Cast Aluminum Cylinder Heads.

Drilling, Counterboring, Reaming and Tapping 1¾" Hole in Aluminum Crankcase Forging Section to a tolerance of ±.001".

Six Cincinnati Bickford 9" column Super Service Radial Drills have given a fine performance and established a record for accuracy and reliability, and have met production problems at Canadian Pratt & Whitney Aircraft Co., Ltd. Modern Cincinnati Bickford features for convenient easy handling, power and speed have made these machines highly profitable. Investigate these money makers.

Write for Bulletin R 21C.

Photos courtesy of Canadian Pratt & Whitney Aircraft Co., Ltd., Montreal, Canada.

80 YEARS OF SERVICE

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

CONTINENTAL COUNTERBORES

INTERCHANGEABLE WITH A

Twist of the Wrist

Continental Counterbores may be purchased individually or in sets. Selection of three sets available. Write for new Counterbore Catalog.

THESE FEATURES WILL SAVE YOU TIME AND SAVE YOUR TOOLS:

Hand Detachable—one quarter turn by hand, ***a twist of the wrist*** engages or releases cutter.

Balanced Drive—*double* lugs on cutter engage *double* abutments in holder; *double* aligning bearings for rigidity.

Extra Torsional Rigidity—drive lugs are close to seating shoulder of cutter.

Practically Indestructible—driving forces apply compression, not shearing action.

Right or Left Hand—one quarter turn locks or releases either right- or left-hand cutters.

Outside of Holder Free from Obstructions—obtainable for piloting in bushing, fluted to remove chips or threaded for stop nuts or collars.

The Continental Drive is available in standard counterbores, spot facers, countersinks, and also on special tools such as multiple-diameter cutters, step counterbores, radius and chamfering applications. It is equally applicable for inverted operations. Order through your Ex-Cell-O representative or direct from Continental Tool Works in Detroit.

CTW

Other Continental Products: Standard and Special Cutting Tools, Broaches and Broach Fixtures.

CONTINENTAL TOOL WORKS
Division of Ex-Cell-O Corporation, Detroit 32, Michigan

To many investors, a conservative security

if 4½ percent interest is "gilt-edge"

CONTINENTAL TOOL WORKS
Division of Ex-Cell-O Corporation, Detroit 32, Michigan

To many investors, a conservative security that consistently yields 4½% is considered "gilt-edge." But here is an investment that consistently yields 50% or more a year—with no risk to you.

To drill oil holes in this crankshaft with standard equipment and obtain 46 cranks/hr. would take many machines and operators.

With the Avey machine and one operator, unit costs drop so far that the machine is paid for in less than 18 months.

The 14-station machine has Line-O-Dex indexing, automatic hydraulic clamping and positioning, and drills ¼" holes with Avey-draulic Torquematic deep hole drilling units.

When this order is complete, or the part changes in design, the Avey standard units can be rearranged for a new job ▶*an economical way to extend the life of your investment.*

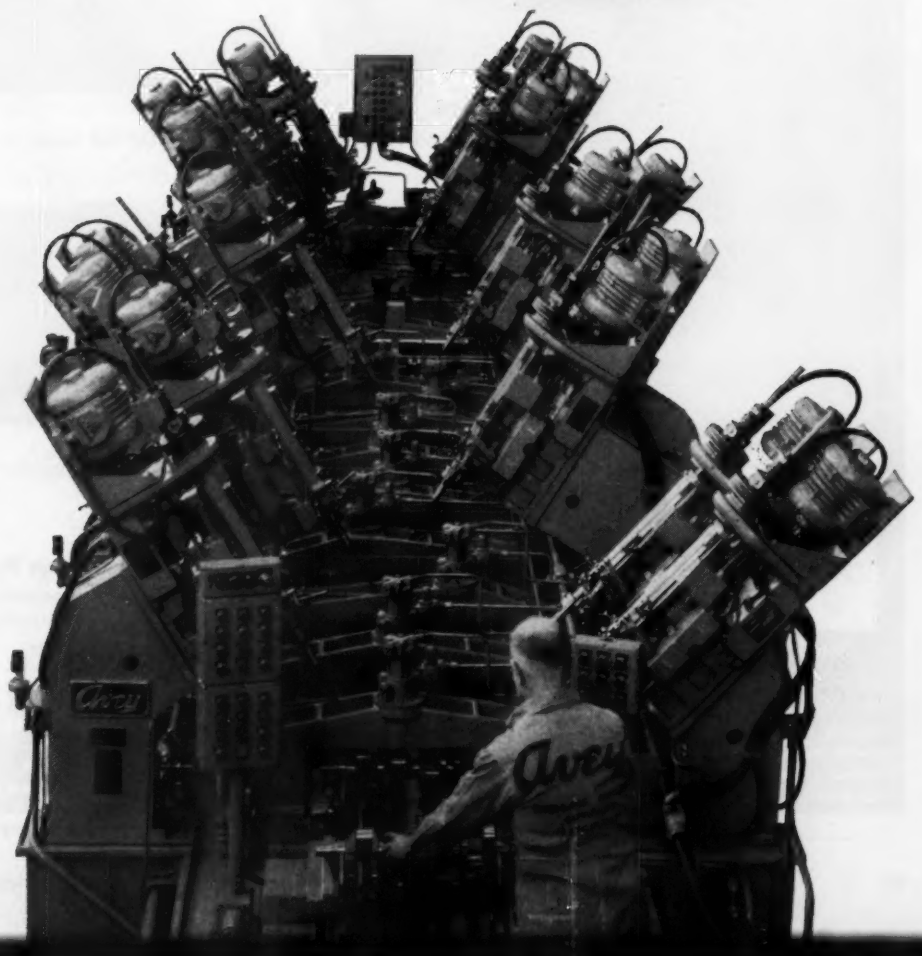
Avey's pay-as-you-produce plan helps you make this fast-earning investment now. Whether your part is a crankshaft or a door check—ask Avey for a *profit prediction.*◀

THE AVEY DRILLING MACHINE CO., CINCINNATI 1, OHIO

drilling, tapping, production machines

... what's 50 percent?

Avey



HARDINGE COLLETS and FEED FINGERS
for NEW BRITAIN Automatics*

HARDINGE
ELMIRA, N.Y.

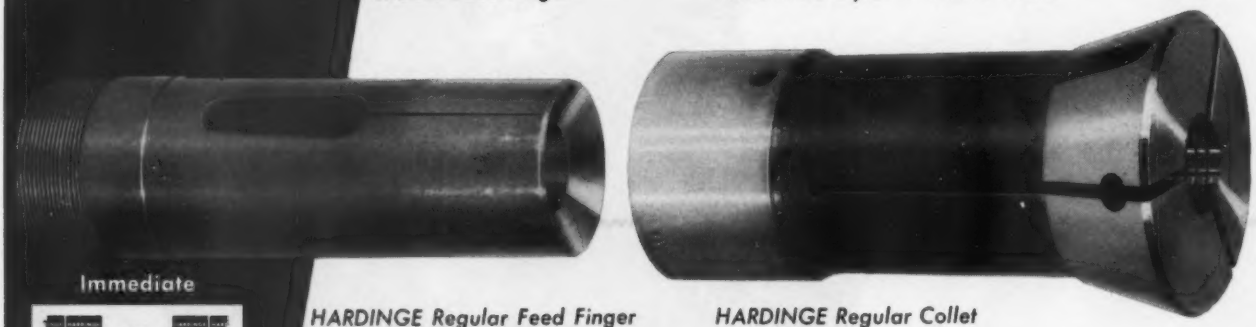
Assure Maximum Production at Lowest Cost

Reduce tooling costs and step up production on your New Britain Automatics with HARDINGE customer shop-proved collets and feed fingers.

** Also available for the following automatics: Cone, Greenlee, Gridley and Acme-Gridley, National Acme.*

HARDINGE Style "B" Master Feed Finger

HARDINGE Style "S" Master Collet



HARDINGE Regular Feed Finger

HARDINGE Regular Collet

Immediate

Stock Delivery

from Hartford
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Detroit San Francisco
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Choose for your requirements:

Hardinge Master Collets and Feed Fingers . . .
The only master collet with no work pressure on the screw.
Pads are completely interchangeable among machines of similar capacity.

Hardinge Regular Collets and Feed Fingers . . .
Precision made, hardened and ground internally and externally.

One source of supply for all collets and feed fingers.

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Offices in principal cities. Export office 269 Lafayette St., New York 12, N. Y.

"The Man in the Barrel" recommends . . .

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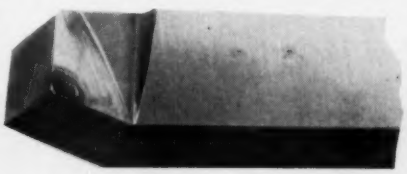
balanced for your particular operations

● What is your operation? Gear shaping, high speed automatics? No matter . . . because Stuart Oil Company has balanced cutting oils for you . . . with just the right amount of lubricity, temperature control and chemical activity to provide you with the optimum in finish, production and tool life.

Stuart's Balanced Cutting Oils are made under laboratory control. You are assured of a uniform product that will provide consistent results. It is not a so-called "all purpose" cutting fluid but an oil that has been specifically blended to produce the very best results obtainable under the conditions you will subject it to.

Perhaps you are blending your own cutting oils now . . . or using other types. Letting a Stuart Representative, "the Man in the Barrel", explain and demonstrate a balanced Stuart Cutting Oil, may bring you new savings in time, money, worry and a quality improvement in your product. Fill in the coupon below today. Ask to have "the Man in the Barrel" call on you.



The cutting tool at top shows an abnormal front clearance caused by *excessive chemical activity* of cutting fluid. The lower cutting tool shows cratering, usually associated with poor finish, resulting from insufficient *chemical activity* of cutting fluid used.

More than a "Coolant" is Needed

D. A. Stuart Oil Co.
EST. 1865 LIMITED

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS

2729 S. Troy St., Chicago 23, Illinois
In Canada: Canadian D. A. Stuart Oil Co., Ltd.
3575 Danforth Ave., Toronto

A quick guide to starting recommendations for any job.

CLIP TO YOUR COMPANY LETTERHEAD AND MAIL TO

D. A. Stuart Oil Company
2729 S. Troy Street, Chicago 23, Illinois

☐ Please have "the Man in the Barrel" call.

☐ Please send a Stuart's Cutting and Grinding Fluid Selector and Dilut-O-Graph Folder.

Name .....

Title .....

Even the smallest size Reamers are Standard with L&I

The Reamer Specialists
LAVALLEE & IDE, INC.
CHICOPEE, MASS.

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Pride and Prejudice

There is no question but that Mr Jack Kleinoder has properly emphasized the threat to the tool and die industry inherent in the mounting shortage of skilled tool and diemakers (*AM*—Feb 14 '55, p137), but somehow we don't think he has gone quite far enough in his analysis of the cause of the apprentice shortage. Admittedly, there are a lot of shops which feel no obligation to train men, and this attitude is to be deplored. But let's not concentrate our criticism on the shop owners alone.

Three important factors have, we think, been overlooked in the Kleinoder story. One of them is wrapped up in our present-day social views and is a subject for some debate, so we'll just touch on it very lightly. However, it's probably the most important of the three, so please don't minimize it.

The number one factor to discourage any apprentice training program is our rather unrealistic belief, in America, that everyone should become some sort of white-collar executive, and that being a tool and diemaker, even a top-flight one, is not very respectable. In fact it's little better than being an ordinary laborer. At best, a diemaker is a "mill hand" or a "factory worker," and today's well educated (?) American youth certainly has no intention of gearing his schooling to such a menial task. As a consequence, individuals who write letters such as you reproduce on page 137 are the exception rather than the rule.

Now, we've already admitted that this argument is open to discussion, and we fully expect some people to disagree with us. We sum up the point, however, with just one query: Whatever became of the top hands in the tool and die shops who were privileged to have their pictures taken, wearing a silk hat, Sunday-go-to-meeting clothes, and the small square apron that distinguished them as the aristocrats of their craft?

Factor number two to be contended with in any apprentice training program is our average worker's attitude toward his weekly paycheck. In many areas, there's enough work available on production lines to attract any youngster with a smattering of experience in machine tool work. Most of these jobs pay very good money—more than any man can expect to make during the two to four years required for apprentice training. Consequently, the worker

GRINETICS

By D G SMITH

SUPERSEDE

PRODUCTION DATA

STEEL MAGNATE

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. . . all mechanical units built around rugged one-piece column casting to insure permanent alignment of cross-slide saddleways and vertical headways. Column is mounted on heavy cast iron base for maximum rigidity and freedom from vibration.

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. . . in both *initial* cost, and continued, trouble-free operation, Reid grinders are quality engineered throughout to provide accuracy and dependability.

CAPACITY

. . . 6" x 18" x 17¼" (from center of spindle to work-table). Choice of four models: either hand feed table, or power feed table with speed variable from 12 to 35 feet per minute. Complete accessories for wet or dry grinding and special operations are available.

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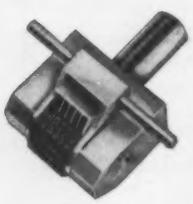
MARKING MACHINE
air-marks
2500
pieces per hour
AUTOMATICALLY

FEATURES
Cyclomatic Control

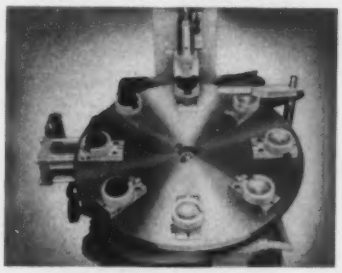
This new Model 400 dial feed marking machine is another example of NOBLEWEST'S unique ability to provide industry with high speed equipment for permanent marking . . . *good for the life of your product.* Featuring an air operated press head and dial feed, the basic model incorporates NOBLEWEST CYCLOMATIC Control . . . an exclusive electro-pneumatic circuit which provides continuous automatic cycling at any speed to suit operator. Supplementary controls for semi-automatic operation from a foot switch, for short runs, are also provided as well as independent operation of press head and dial feed for set-up purposes.

If you have a marking or numbering problem in steel or other metals—wood, fibre, hard rubber, or plastic—NOBLEWEST makes the machines, dies and workholding fixtures for doing the job *better, faster* at *lower cost.* For complete details, write Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.

This close up shows Model 400 tooled for serial numbering plastic part shown above. Operator simply loads dial, parts are then automatically ejected after being numbered.



NOBLEWEST Automatic Numbering Heads such as used on the machine at right are standard in the marking industry. They offer unlimited applications for constant, selective and consecutive numbering. Made to the most exacting standards of quality, they are competitively priced.



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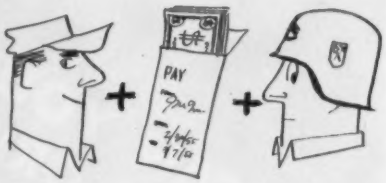
NOBLEWEST
ORIGINATORS OF THE ROLL MARKING PROCESS
EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING



chooses to accept the better paying job and goes on to the production line instead of the training course.

The decision to accept the better paying job is usually influenced by the third factor which looms larger than many industry men like to admit. This is the imminence of being drafted into the armed services.

The effect of military service is too well known to warrant detailed discussion here. Suffice it to say that NTDMA would be well advised to give serious thought to an organized campaign which would result in draft exemption for apprentice diemakers. We know of several shops in this area which have virtually abandoned training programs because their apprentices have been drafted into the army or navy before their training was half finished.

There are other facets to the problem. The low pay offered apprentices is of great importance, even among those who are not subject to military service. This has bred some unusual solutions. We know of one small shop which has, as its most promising apprentice, a very feminine young woman whose work is above question. She snatched at the opportunity to go into training when the young men to whom it was offered turned it down in favor of production-line jobs at a local aircraft-engine plant. Now, the shop has a waiting list of women who want to become tool and diemakers!

There are, of course, many ways to tackle the problem but, from where we sit, it appears that the number one job is to make the craft the honored "profession" it really is. That means instituting some sort of program in schools and other social organizations to counteract the widely held and ridiculous notion that being a tool and diemaker is something less than being a bank executive or company president. The public should be told, forcefully and constantly, that the finest engineering miracles of today would be nothing more than dreams in the minds of engineers without the tool and diemakers who translate those dreams into practical realities.

It may seem strange to receive a letter like this from an industrial advertising agency, but don't forget

that we, too, have as much at stake in this problem as any machine shop, because our livelihood depends on it also.

John J Lange
R H Young & Associates
West Hartford, Conn

1807 Automation

I read Mr Colvin's letter with a great deal of interest (*AM*—Feb 14 '55, p100). It certainly came as a shock to hear that screw conveyors and bucket elevators were in practical use at that time, and one can't help wondering why such obviously good ideas were allowed to fall into disuse. The whole idea of moving material from place to place without the use of human labor is so fundamentally simple that, once demonstrated, one could expect it to be taken up immediately and applied to all kinds of work. Instead, it was neglected until quite recently, and then everybody makes a big song and dance about it.

I have been in the habit of considering our forefathers as pretty smart men, but I'm beginning to have my doubts about some of them.

Thos Fielding
Cleveland

Prehistoric

Your article on the origins of machine tools (*AM*—Dec 20 '54, p101) was a remarkable piece of work, deserving of the highest praise. I have no intention of being facetious about it, but it gave me the idea for the enclosed cartoon. I hope it will give your readers a chuckle and perhaps serve as an object lesson to show how machine tools have contributed to removing the load from human muscles.

L Mortison
Cheshire, Conn

"He's demonstrating how much faster the stone age people could have worked their bow-drill if they only had a shaper."

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Excessive Drill Costs!
...EQUIP Your Toolroom
with OLIVER DRILL POINTERS

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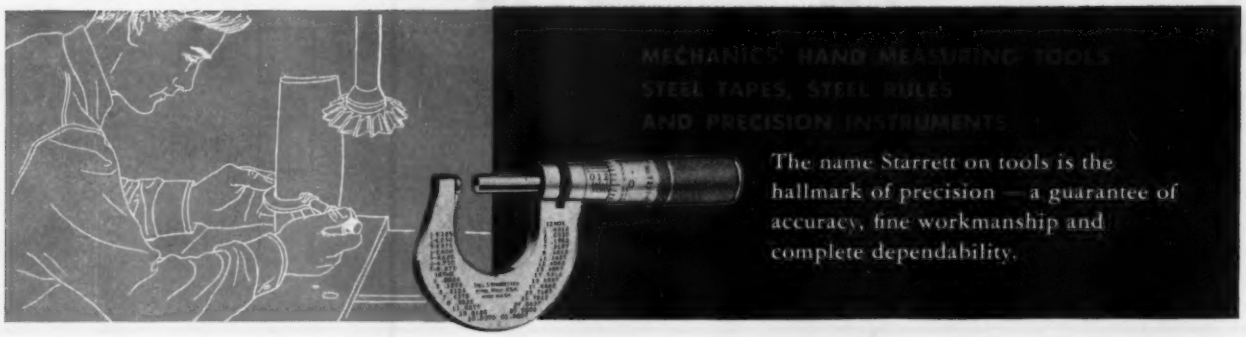

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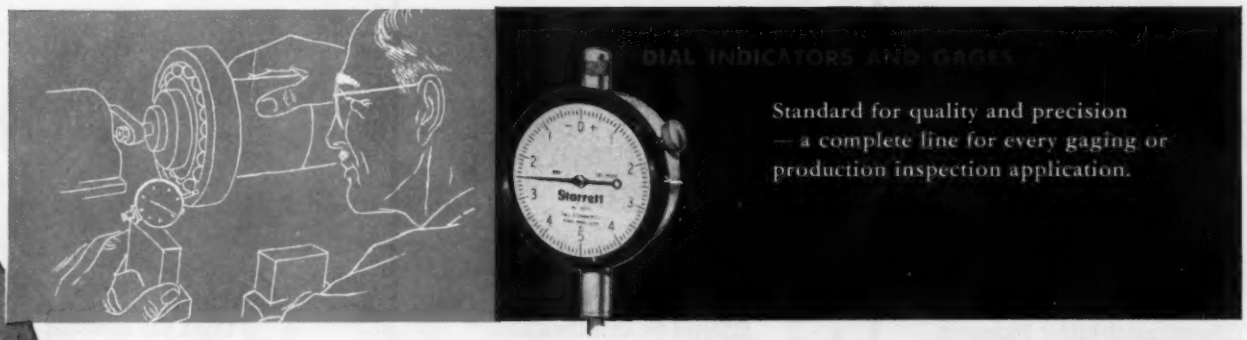

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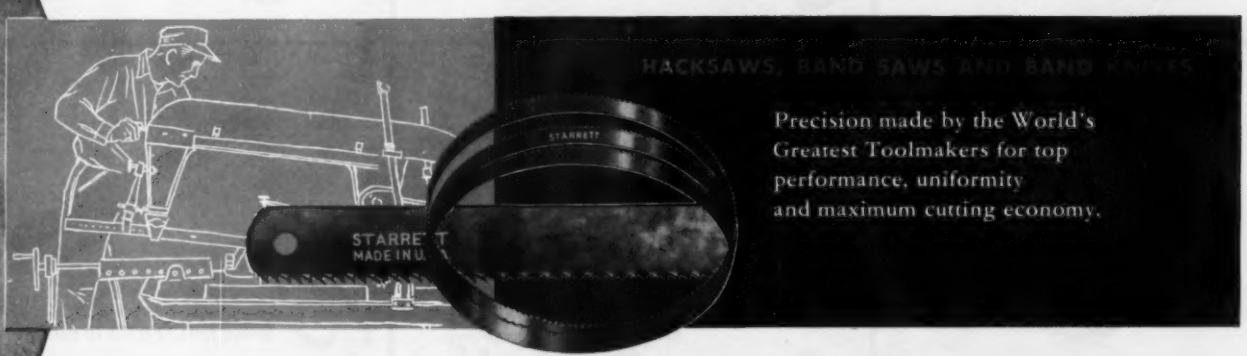

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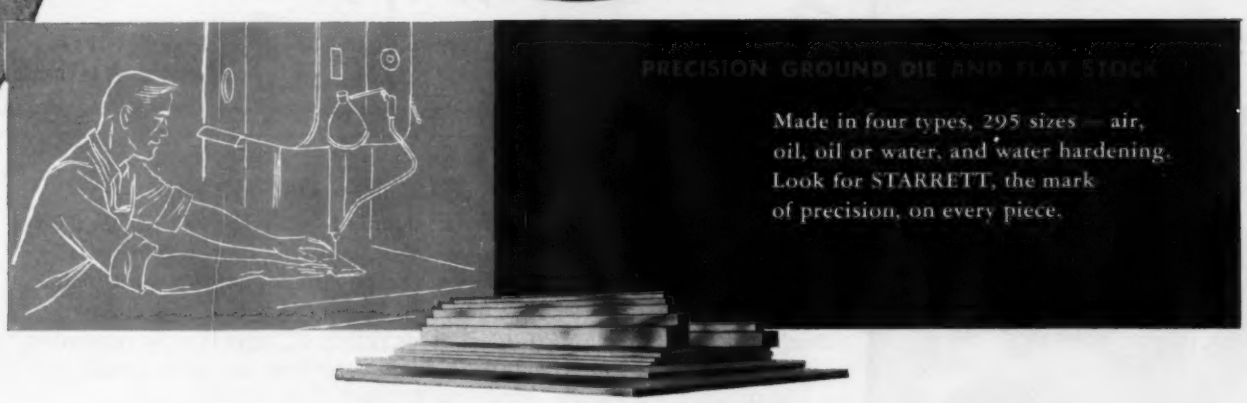

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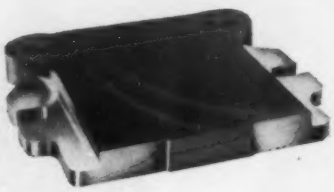
How many different 10x10 DANLY DIE SETS

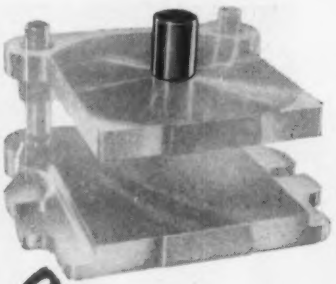
can you order from stock at your nearby DANLY Branch?

- ☐ 100 ?
- ☐ 1251 ?
- ☐ 4763 ?
- ☐ 31,104 ?

3 different punch holder thicknesses

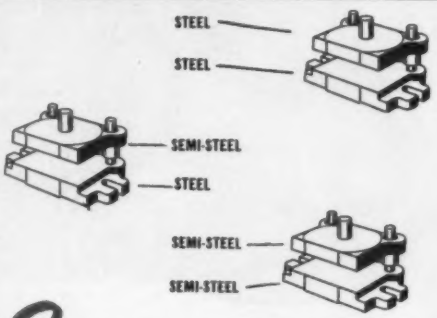


3 different die shoe thicknesses



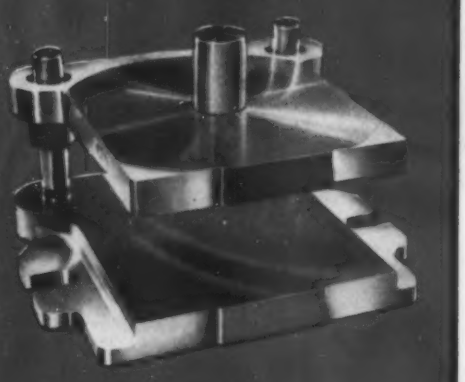
6 shank size variations

4 bushing type variations



3 different material combinations

16 guide post lengths in each of **3** different styles to choose from



Multiply all of these combination possibilities together and you'll discover that there are *31,104* different standard Danly Die Sets in just this *one* size . . . and all are cataloged and *stocked* in the Danly Branch near you. Amazing? Yes, but it serves to illustrate an important point for *your* benefit. The almost unlimited variety of Standard Danly Die Sets *in stock at your Danly Branch* will meet your specific needs exactly . . . and fast. So remember, when you want the best in die sets in the shortest time, the place to call is your local Danly Branch.

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DIE SETS . . .
STANDARD OR SPECIAL

DIEMAKERS' SUPPLIES

Spot News of Metalworking . . .

Battelle to study titanium fabrication . . .

The government has awarded Battelle Memorial Institute, Columbus, Ohio, a $1-million contract to establish a laboratory for study of titanium fabrication problems, and to provide customer service for firms working titanium. Contract runs for 18 months.

UAW oils up its strike gear . . .

Cleveland labor relations experts see the two recent wildcat strikes at Ford Motor Co's Cleveland plants (protesting firing and suspension of UAW workers and an alleged speed-up by the company) as the time-honored warm-up for a general strike against autodom's giants.

Detroit and Pittsburgh—models for Russia?

Scrappage is so high in Russian metalworking plants, being more than 50% in some "machine industries," that Pravda, official Soviet newspaper, suggests that Russian officials could learn a lot by studying Detroit and Pittsburgh production techniques.

Yugoslavia gets technical know-how . . .

Yugoslavian metalworking plants are seeking technical assistance from western European nations. Assistance includes: license to manufacture, production know-how, special tooling required, training of Yugoslav technical personnel, securing raw materials or semi-finished products. Contracts already are signed with Swiss, Italian, Austrian British firms.

$62-million components plan gets Vance approval . . .

$62-million components program has been approved by the Vance Committee and will be put into effect as soon as cleared by Borrowing Authority Review Board of Office of Defense Mobilization. General Services Administration will issue orders, which will be mostly for machine tools to enlarge capacity for making turbines and gears.

Bonding bronze cable to rails . . .

New method of bonding bronze cables to railroad rails involves silver brazing on the stud welding principle. Operation takes only 1 second, doesn't involve enough heat to damage the rail or cable. Complete outfit is mounted on a light cart riding on rails or retractable rubber-tire wheels.

All-plastic rocket motor . . .

Successful tests have been completed on an all-plastic rocket motor that achieves a 1000-lb thrust, is said to have a bursting strength of better than 3000-psi, costs less, weighs less, is less susceptible to handling damage than conventional rocket motors.

Everything you need to know about Bushings

Write Ex-Cell-O for this Bushing Guide —ask for as many copies as you'll need.

54-5

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A Complete Bushing Guide

for your Engineering and Purchasing Files!

THE ANSWER to all your Drill Jig Bushing requirements

This catalog pictures and describes the six principal types of A.S.A. standard bushings, tells how to use them. Gives helpful suggestions to purchasers and designers. With blueprints of the different types, lists hundreds of Ex-Cell-O bushing sizes constantly available from stock. MAKES ORDERING QUICK AND EASY.

IMMEDIATE SHIPMENT from Detroit, New York, Los Angeles and London, Canada. Address of nearest source at right.

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Washington . . .

New schemes on defense facilities . . .

The administration is still wrestling with the problem of how to help faltering defense industries that are not direct military suppliers. Idea is to keep idle strategic capacity on standby or even in partial production. This is already done for many military contractors, of course. But metalworking firms who do not sell directly to the military get no aid.

Two proposals so far have come up—and been knocked down:

ODM recommends government financing to maintain such facilities idled by drops in defense business. In other words, pay certain machine-tool makers, component producers, steel fabricators, and others to keep selected capacity on standby, just as military capacity is kept on standby. ODM Director Flemming proposed a new provision in the Defense Production Act, to be extended this spring, granting such authority. But Treasury Secretary Humphrey and Budget Director Hughes voted against the scheme, said it would be too costly.

Commerce Secretary Weeks proposed a more ambitious program, aimed specifically to help defense-supporting industries hurt by imports. It would work like this: the government would spot industries in trouble because of foreign competition, then determine whether "unique skills" essential to defense might be lost if the industry kept going downhill. Washington would then slap tariffs or an embargo on imports, make direct subsidies, or stockpile some of the industry's output.

Weeks' plan will be taken up soon by the cabinet-level Defense Mobilization Board. A DMB task force of lower-echelon officials has already turned thumbs down on the scheme, said it goes against the President's free trade program. But Weeks is fighting hard on the proposal and may seek Congressional support.

$1.3-Billion ship program . . .

House Armed Services Committee has authorized a $1.3-billion Naval shipbuilding program. It calls for a fifth 60,000-ton aircraft carrier (committee said such super craft are vital, denied they are "sitting ducks" for enemy attack), three more atom subs, five conventional subs, and more guided missile vessels.

The committee voted down an amendment specifically authorizing construction of some of these ships in West Coast yards even if costs were higher.

100 Biggest contractors . . .

Pentagon won't be able to supply Senator Fulbright's stock market investigators with the list of 100 biggest military contractors for another month. Fulbright has emphasized importance of such data in his study of stock price rises. Defense Dept formerly compiled the listing regularly, stopped the project some months ago as valueless.

Threat to fast amortization . . .

Democrats in the Senate proposed repeal of fast amortization as part of their drive to get politically one up on the Republicans in the tug-of-war over tax cuts.

The Democrats hoped to recover enough money from this repeal—along with repeal of the new law on double taxation of dividends—to make up for their proposal to cut a few dollars off every individual's tax bill.

The Senate voted this down, however, and approved the bill Eisenhower wanted — continuation of the present 52% tax rate on corporation income, and continuation of excises that were due to drop on April 1.

Actually, it's doubtful that repeal of fast amortization would ever have gotten through Congress. Mainly, the Senate Democrats wanted to have this as a trading point in the conference committee that irons out differences between House and Senate versions of the same bill.

Nevertheless, you can look for tax amortization to figure in the maneuvering next year, when election year pressures for a tax cut will be at their maximum.

Tariff decision on bikes . . .

Eisenhower faces a tough decision on whether to raise tariffs on lightweight bikes from abroad. The Tariff Commission has recommended an increase under the escape clause of the Reciprocal Trade Law. If he turns down the US bike makers, he will be in trouble with protection-minded Congressmen who are fighting the last battles against giving Eisenhower authority to reduce tariffs further. If he grants the tariff increase, he'll be in trouble with our allies who say they must trade with us.

Bike makers have as good a case as any yet brought to the White House. Figures show bike imports jumping from 245,000 in 1952 to 963,000 in 1954. Profits, employment, and production in the US industry have dropped during the same period.

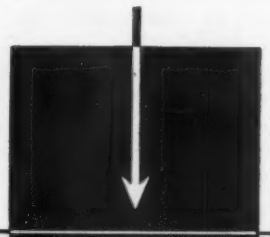
Tariffs on bikes have been negotiated downward from 30% to the present 7.5%. On a bike imported at, say, $22, present tariff amounts to $1.65; these are bikes now selling at retail for around $35. If the tariff rate jumps back to 22.5%—the maximum allowable—the duty would be $4.95, which would boost the retail price to around $40.

Eisenhower has 60 days to make up his mind which way to jump.

NUMBER TWO IN A SERIES

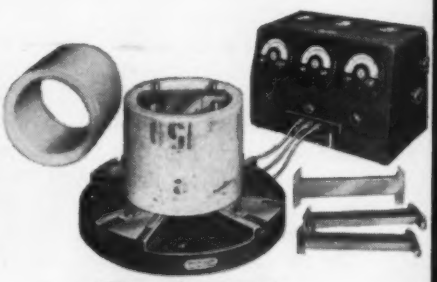
What's The Best Way To Gage These Parts ?

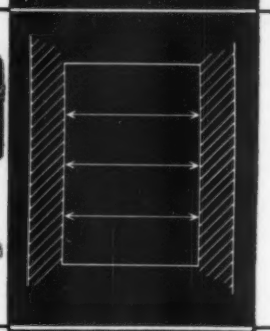
Tips from Taft-Peirce on when and where to use a T-P CompAIRator Air Gage



Three ID's
Tolerance: .120″

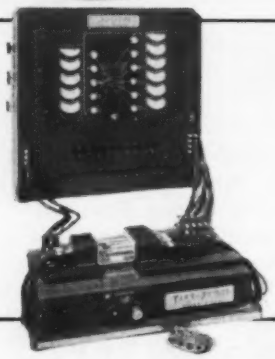
One three dial T-P CompAIRator Air Gage checks three ID's simultaneously on this asbestos cylinder. Only a T-P CompAIRator can check such wide tolerances. Versatile as well as sensitive, T-P CompAIRator equipment may be designed to check most any specific tolerance range from .0001″ to .125″. And most any dimension from simple ID's and OD's to complex tapers, barrel shapes, squareness or ovality.

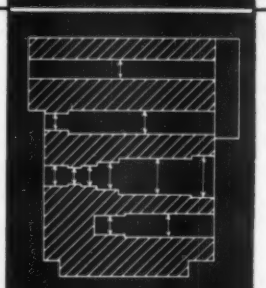




Eleven ID's
Tolerance: .001″

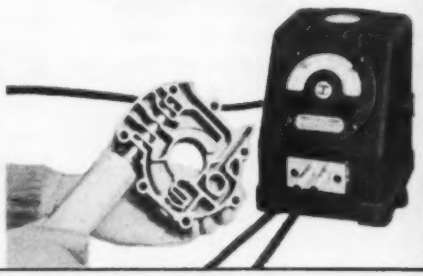
One eleven dial T-P Air Electric CompAIRator reduces inspection of 11 ID's on this valve body to a fraction of a second. Lights indicate any dimensions out of tolerance. Dials give exact readings of size. Savings in time alone paid for this unit in short order. Vibration, jarring, tilting won't disturb its accuracy.

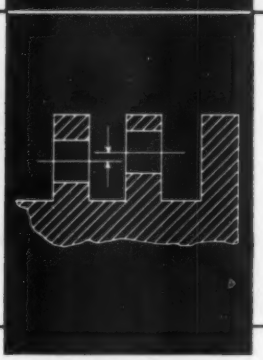




Concentricity
Tolerance: .0002″

This T-P Computing CompAIRator indicates on one dial the total eccentricity between two diameters. Saves multiple measurements and a computation. An exclusive T-P development, Computing CompAIRators may also be used to speed and simplify such checks as center distance, taper, and squareness of bore-to-face.

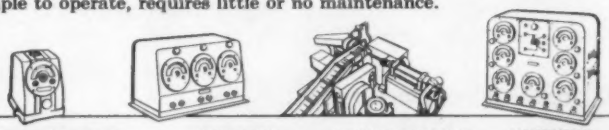




For more examples and the complete story on Taft-Peirce CompAIRator Air Gages send for Bulletin.

WHAT IS A COMPAIRATOR AIR GAGE?

A CompAIRator is a sensitive gaging instrument that measures variations in the velocity of tiny jets of air. When work is placed over these jets, air flow is restricted and its velocity reduced. Any change in air velocity reflects a change in part size, which is immediately shown on a calibrated indicator. Since only air contacts the part in most cases, there is minimum wear on gaging members. Fast, accurate, dependable, a T-P CompAIRator is simple to operate, requires little or no maintenance.



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T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

Detroit . . .

Those wildcat strikes . . .

Wildcats are not yet running wild . . . but the number of labor disputes in Michigan prior to the GAW push is rising.

Union leaders were expected to begin applying pressure late in the winter via the "unauthorized" strike route; the traffic increase is noticeable in the offices of state and federal labor mediators. The State Labor Mediation board received 1295 cases in January and February as against 775 in the same months last year.

So far, actual walkouts in the auto industry itself have been few. In late December, a one-day wildcat by grinders at Chrysler's Auto Body Division accounted for a production loss of about 2000 Plymouths. In February, Chrysler's Indianapolis plant was shut down for a day.

More recently, Ford's Cleveland engine-foundry shops were struck briefly and a walkout at Fisher Body's Flint Plant No 1 dented Buick's record production pace.

There was more action outside autos. Vickers Inc was shut down for more than a week during a dispute with CIO's Electrical Workers. A United Mine Workers local which struck Wyandotte Chemicals Co on Jan 30 was still out in mid-March. In Jackson, Sparks-Withington Co was threatening to move its TV production facilities out of town unless CIO's United Auto Workers agreed to an 18¢-an-hour pay cut. In Toledo, Electric Auto-Lite Co sought agreement on rate structure alterations which would put the company in a more favorable competitive position.

Thus, pressure on auto firms themselves has been relatively light to date. The tempo will increase sharply in April after auto men and the UAW get down to shirt-sleeve bargaining sessions. Auto makers and parts suppliers organized by UAW logically can expect wildcat strikes to flare in ever greater numbers.

How to figure GAW costs . . .

Is being hazily explained to member firms of the Employer Assn of Detroit. While stiffly opposed to GAW, the Association is taking the realistic position that Ford or GM may well open the gates by agreeing to a GAW plan of sorts.

Says the association in a recent communication: "Don't let yourself be trapped into accepting an industry-wide pattern on GAW which is unrealistic for your firm." After cautioning members to beware of the seniority point at which employe eligibility for GAW payment is begun, the association suggests that three cost elements must be considered in analyzing UAW's proposal: (1) cost of short workweeks; (2) cost of full-week layoffs; (3) size of reserve fund.

No 2 is of "greatest initial concern." To estimate maximum potential liability for idle pay, the association says: "select the employment total (at the same time in each month) which marks your highest point in your 'fattest' year. Then select the lowest total employment in your 'leanest' year. The difference represents . . . probable maximum liability . . . suffered if previous economic conditions are repeated . . ." Formula for computing maximum cost for 52 weeks of layoff thus would be: (high point)-(low point) × (average current hourly rate × 40 × 52) equals GAW cost per year.

To figure GAW costs per hour in (A) the leanest year or (B) this year, the Association says: "if we assume that, in either of the two years . . . all of the people laid off since the peak year are still unemployed and drawing maximum GAW benefits, the cost per hour in that year will be represented by the proposition: (total maximum layoff cost per year) over (total employment in (A) or (B) year) equals (cents-per-hour GAW cost)."

A spokesman suggested that GAW could be figured by citing the experience of say, a stamping firm that supplied a Big Three company which suffered a sales setback last year (meaning Chrysler). "Suppliers . . . were contemplating a 3-week layoff, but layoffs ran three to four months, with up to three-quarters of the workforce off."

Assume the stamping firm had 100 employees, 75 of whom were laid off for 16 weeks. Average hourly rate is $2. Absolute maximum GAW benefits paid out would have been $96,000.

The cost, says the Association, "will be softened by (1) stabilization of employment; (2) disqualification by earning wages elsewhere; (3) receipt of payments from state unemployment compensation." The Association did not note that Michigan employers already contribute the full cost of unemployment compensation.

The examples are cited without benefit of full details of the UAW plan, and assume almost the worst possible conditions. In the absence of complete information on UAW's plan, however, the formula probably makes as much sense as any.

Suffering A V-8 shortage . . .

Plymouth is putting all possible steam behind completion of its new engine plant. The division is now shooting for Sept 1 as the date when engines will first roll off the line at the rate of 50 an hour.

5403

do you WASTE MONEY RISK ACCIDENT doing things the HARD WAY?

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With Portelvator hundreds of assembly and maintenance jobs are accomplished at the *right height* and in the *best light*. And that means money in the bank and workmen on the job; faster work and fewer accidents.

Portelvator prices start at $155.00—place a couple at your workmen's disposal and watch results.

Complete description in FREE Bulletin No. P-5403.

WRITE FOR IT!

Address The Hamilton Tool Company, 830 South Ninth Street, Hamilton, Ohio

IT'S A *Hamilton Tool*

USE IT WITH CONFIDENCE

Machine Tools . . .

Air Force Reserve buying has started . . .

Initial orders for the Air Force's $84-million Reserve Machine-Tool Buying Program are said to have been placed. It was earlier expected that the first orders would be distributed in February, but a delay of some weeks was encountered.

Machine tool demand stays up . . .

Strength in machine tool sales, shown by industry figures for December and January, continued in February. New orders total for the three months was amazingly uniform.

The index of the National Machine Tool Builders' Association (see chart) stayed constant around 200. **Orders exceeded shipments in February** for the second consecutive month. Backlogs of builders thus have risen.

Not since September 1953 has incoming machine tool business been so good.

March is believed to have produced sales on a level with the previous two months, builders report.

First-quarter orders, in dollar volume, are estimated at 15% to 20% better than in the comparable period a year ago.

Renegotiation to be continued . . .

The Renegotiation Act probably will be extended for two years, as President Eisenhower has requested, in its present form. This means that machine tool builders will continue to be subject to renegotiation if their yearly sales to defense agencies or military prime and subcontractors exceed $500,000.

Last year the Renegotiation Board exempted "standard commercial items" but has not yet ruled how this policy affects machine tool builders. The law says that machines identical in every "material respect" to machines sold by another firm are not to be renegotiated.

Secretary of Commerce Weeks is reported to have been opposed to extension of the Renegotiation Act. But the military services were aligned against him. The latter were concerned because subcontracts are not covered in price redetermination. Moreover, close pricing still is hard, even with redetermination clauses, on new, long-lead-time items like supersonic planes and guided missiles.

There was no indication that the services are worried about machine tool prices as such.

The Renegotiation Board has a backlog of 18-months' work. It has handled about 16,000 cases and has completed just under 12,000. Some 40% of the completed cases have required renegotiation. Refunds have been ordered in only about one-quarter of the cases renegotiated.

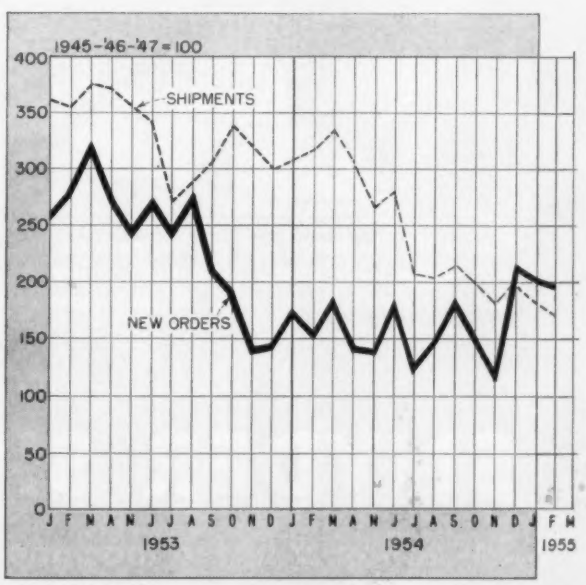
Lodge & Shipley—HPM merger off . . .

The merger is off between the Hydraulic Press Mfg Co, Mount Gilead, Ohio, and the Lodge & Shipley Co, Cincinnati. A consolidation of the two had been agreed upon, but the boards and executive officers of both companies decided not to submit the plan for stockholder approval.

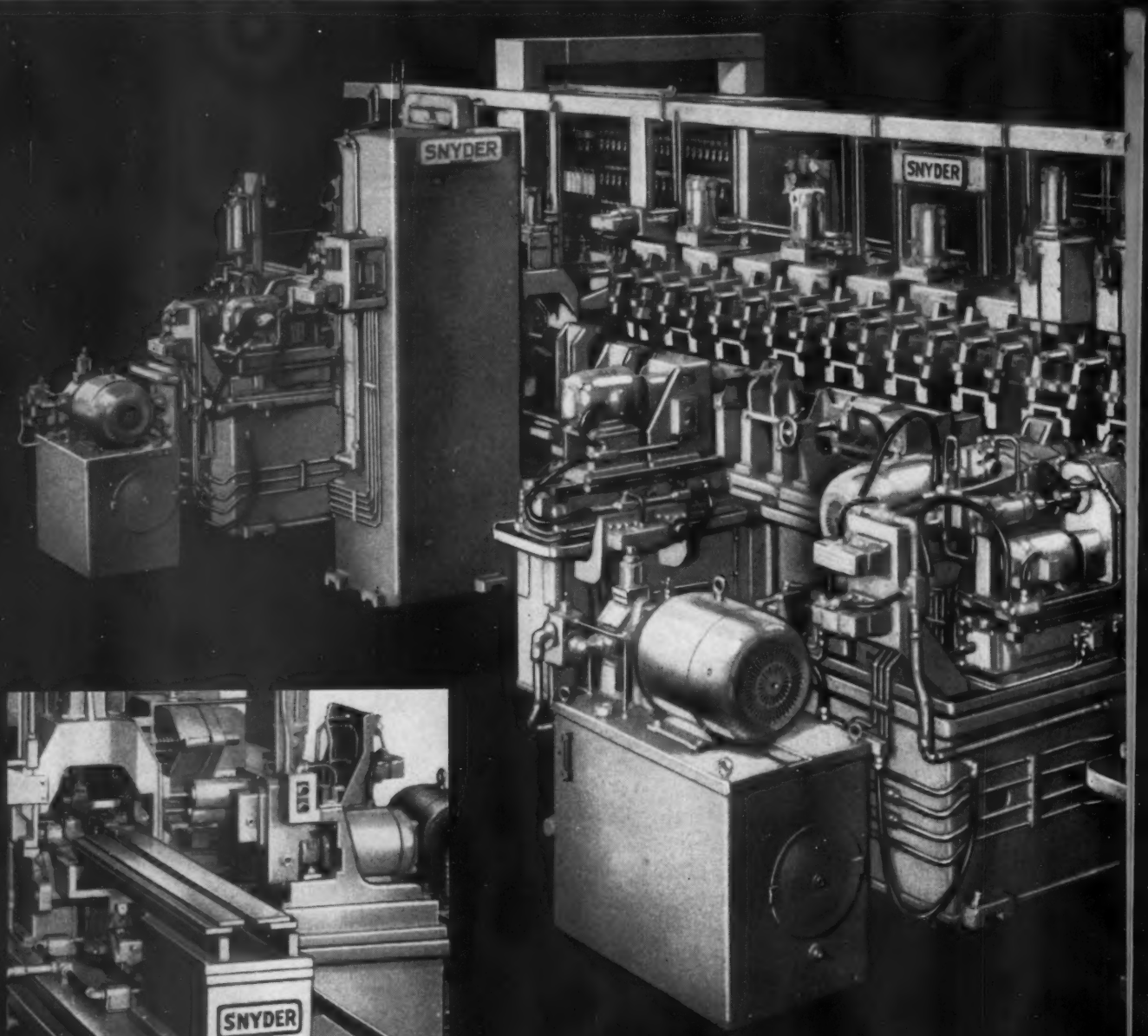
Earlier, a merger was proposed of HPM and the Birdsboro Steel Foundry Co, owned by Frederick Richmond and his associates. But HPM stockholders rejected it.

Gear Grinding Machine Co, Detroit, controlled by Mr Richmond's group, is spending $500,000 to enlarge its plant one-third to produce its new single-spindle automatic screw machine known as the Screwmatic. The company heretofore has not built automatic screw machines.

Penn-Texas Corp, headed by Leopold D Silberstein, has nominated a full slate of 10 directors to the Niles-Bement-Pond board, in opposition to the present board members. Mr. Silberstein's group is soliciting proxies in support of the nominees to be voted upon at the company's annual meeting early in April.



PRELIMINARY FIGURES FOR FEBRUARY on the National Machine Tool Builders' Association Index show that new orders for machine tools are holding close to the high levels established in December. Based on reports from approximately two-thirds of the industry, the figure stands at 198.2 on the Index, may run higher when complete returns are in. On the same basis, shipments continued a slow decline to 171 on the Index



This is the discharge end of the machine. The part, which is originally in vertical position, is laid horizontally and swung 90° to expose all sides to the tools.

SNYDER SPECIAL automatic

24-station transfer machine for processing automotive water pump housings; drills, mills, faces, chamfers, taps all holes and probes tap drill holes. Production, 81 pieces an hour at 80% efficiency.

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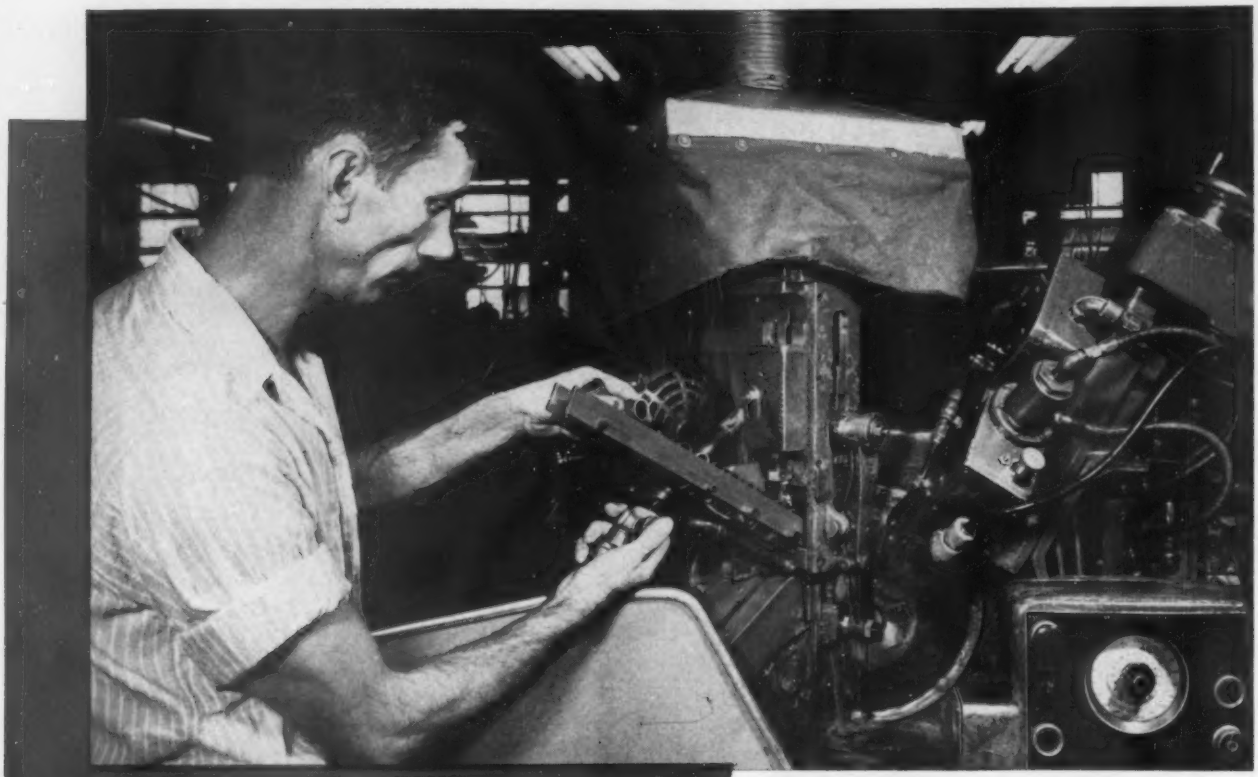

HOW BETTER LUBRICATION INCREASED PRODUCTION

for Tyson Bearing Corporation, Massillon, Ohio

THE JOB is grinding O. D. of bearing cones. Four micro-centric grinders are used.

BEFORE TEXACO was used, the sleeve bearings in the grinding and work spindles lasted only about three weeks, and production was off due to excessive machine downtime. Cause of bearing failure was contamination of spindle lubricant by the grinding oil, resulting in ineffective lubrication.

AFTER TEXACO *Cleartex Oil* was installed—to be used as both grinding oil and machine lubricant—the improved lubrication eliminated bearing failures. *There hasn't been one now for over a year!* And with *Texaco Cleartex Oil,* Tyson can get as many as twenty pieces (with better finish) per wheel dressing—as against the ten or twelve previously obtained.

These benefits are typical wherever Texaco takes over. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help you do all your machining better, faster and at lower cost. A Texaco Lubrication Engineer will gladly help you select the right ones for your jobs.

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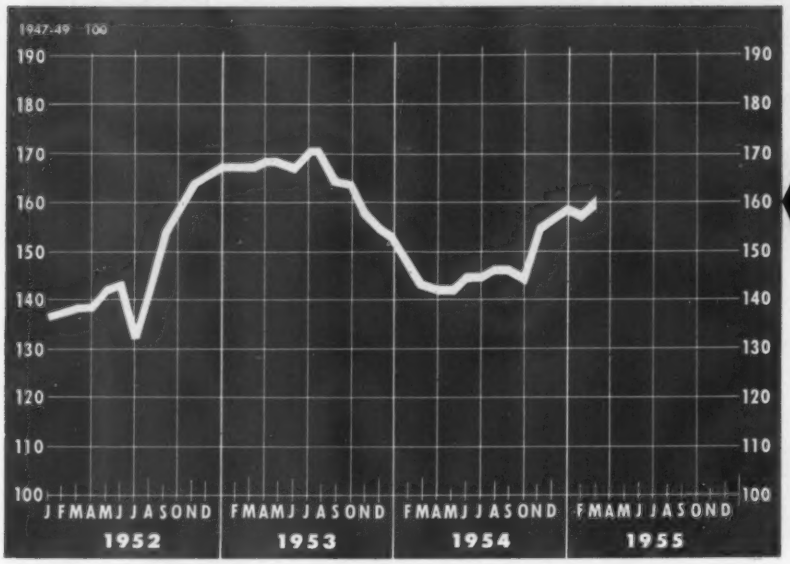
Gaging Metalworking . . .



160

Production Index

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAR '55(*)	FEB '55(p)	JAN '54(r)	FEB '54
Total index..	**160**	**158**	**156**	**151**
Machinery	**127**	**123**	**130**	
Electrical Machinery	**189**	**188**	**163**	
Autos	**148**	**152**	**114**	
Other Transportation	**275**	**262**	**291**	
Other Metalworking	**128**	**128**	**128**	

(*) Estimated (p) preliminary (r) revised

AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

Operations stay near peak . . .

Metalworking's production performance in the first quarter has never before been equalled in a like period, except in World War II and in 1953, when the post-Korean defense program was at its peak.

Operations have been rolling along at 157 on the AMERICAN MACHINIST index since the first of the year. The index was at 154 in January 1954 and then went down to 147 in March. In the similar period of 1952 the spread was from 137 to 139.

All of Metalworking admittedly has felt the exhilarating effect of record-smashing auto output.

Thousands of plants, far removed from Detroit, have added men and hours to their work schedules to meet what seemed at times to be an insatiable demand from automobile companies.

No letup in automotive assemblies is in sight. And perhaps there won't be until the UAW strike threat disappears. Anyway, cars are selling at a fabulous rate for what is regarded as "out-of-season."

Better business reported everywhere . . .

Evidence comes in from all segment of Metalworking that sales and inquiries are growing. The bullish tendency is not confined to the automotive field.

Heavy goods are doing better. Whereas backlogs of industrial machinery and supplies were shrinking steadily throughout 1954, that is no longer true. The opposite trend holds in many cases.

In the farm implement and tractor business, things are looking up. More men are being employed and the work-week is lengthening. The gain is not phenomenal, but is in the right direction.

Household appliance makers are closing a very good quarter. Several manufacturers report sales and production surpassed last year's similar quarter by a healthy margin. And the outlook is bright.

Housing starts set February record . . .

Housing starts in January and February were 25% ahead of a year ago. Work was begun in February on 90,000 units, a new high for the month.

Heavy electrical equipment production is going full tilt. Business placed thus far this year is far in excess of the dollar volume done in the like period of last year.

Aviation industry going strong . . .

Aviation industry has pulled in its operations a little, but continues to give major strength to Metalworking. It promises to stay indefinitely at about the current level.

Orders for industrial supplies and machinery have climbed to the highest point since the end of the Korean war.

Tool and die shops report that incoming business has been the best in many months. This gain, coupled with a decline in production, had added to backlogs.

Steel sales are big . . .

Steel demand is at the best rate in 15 months. What's more it promises to stay big for at least the next month or two.

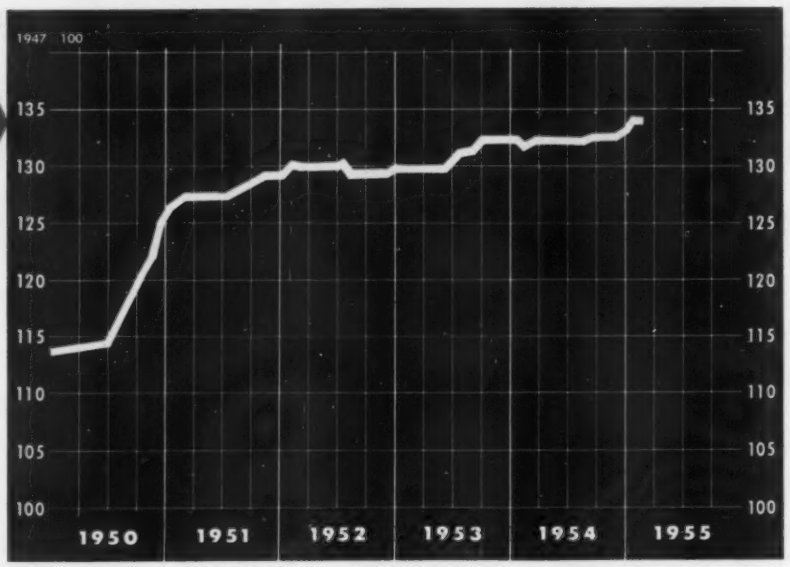
Sales are well spread over all types of products. Flat-rolled items, of course, are the most active of all steel products. While there may be some building of inventories as a strike hedge, it is not extensive.

Gaging Business . . .

Price Index

	MAR '55(*)	FEB '55(p)	JAN '54(r)	FEB '54
Total Index	**134.1**	**134.0**	**133.9**	**132.8**
Metalworking Machinery	**145.8**	**144.3**	**142.0**	
Other Machinery exc. Electrical	**138.5**	**138.0**	**137.5**	
Electrical Machinery	**132.0**	**132.0**	**132.0**	
Fabricated Metal Metal Products	**130.4**	**130.6**	**129.1**	

(*) Estimated (p) preliminary (r) revised



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

Industrial production gains in March . . .

Industrial production has not yet shown any signs of halting its upward movement.

Take February. The Federal Reserve Index hit 133, with 1947-1949 taken as 100. It was the largest spread (7%) over the same month a year ago since the upswing began last fall.

Among the February gains: Rubber, chemicals, paper, automobiles, appliances, primary metals, petroleum products.

March is likely to show up better than February on the index. Output of durable goods seems certain to rise. Non-durables also are doing well.

What April will bring is not clear. But no one will be surprised if operations should stay about where they are, or possibly should taper a bit.

Capital spending is bigger . . .

Outlays for new plant and equipment this year will be up a little from 1954, according to a Department of Commerce survey.

Beneficial effects of the business upturn since the first of the year have induced many manufacturers to revise upward their spending ideas for '55.

Inventories are being built up . . .

Business is now in the process of building up its inventories. This process has gone on during February and March.

At the end of January, inventories were $3.3 billion below a year ago. Total stocks were the same as in December, after allowance for seasonal adjustments. A decline in manufacturers' stocks was offset by a gain in retailers' inventories.

Consumers are on a buying spree . . .

Consumers are spending more of their money ond saving less than at any time since the Korean buying spree. Retail sales are 10% ahead of 1954.

The nation appears to be heading for the biggest Easter trade in history.

Gross national product is put at an annual rate of $370 billion, far above expectations.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949 = 100)*	139.3	139.0	120.6
Steel ingot operation (thousands of tons)	2,232	2,241	1,613
Electric power output (million Kilowatt hours)	9,726	9,727	8,519
Production of automobiles and trucks	203,149	192,892	143,478
Engineering construction awards (*Eng. News-Record*—millions)	$374.8	$358.2	$215.4

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949 = 100)*	133	131	125
Index of durable manufactures production (1947-1949 = 100)*	147	145	139
Durable goods manufacturers' sales, millions*	12,294	12,026	11,580
Electrical machinery manufacturers' sales, millions*	1,335	1,389	1,328
Other machinery manufacturers' sales, millions*	1,900	1,850	1,959
Durable goods manufacturers' new orders, millions	12,408	12,284	8,475
Electrical machinery manufacturers' new orders, millions	1,216	1,050	987
General machinery manufacturers' new orders, millions	1,903	1,865	1,378

*Seasonally adjusted

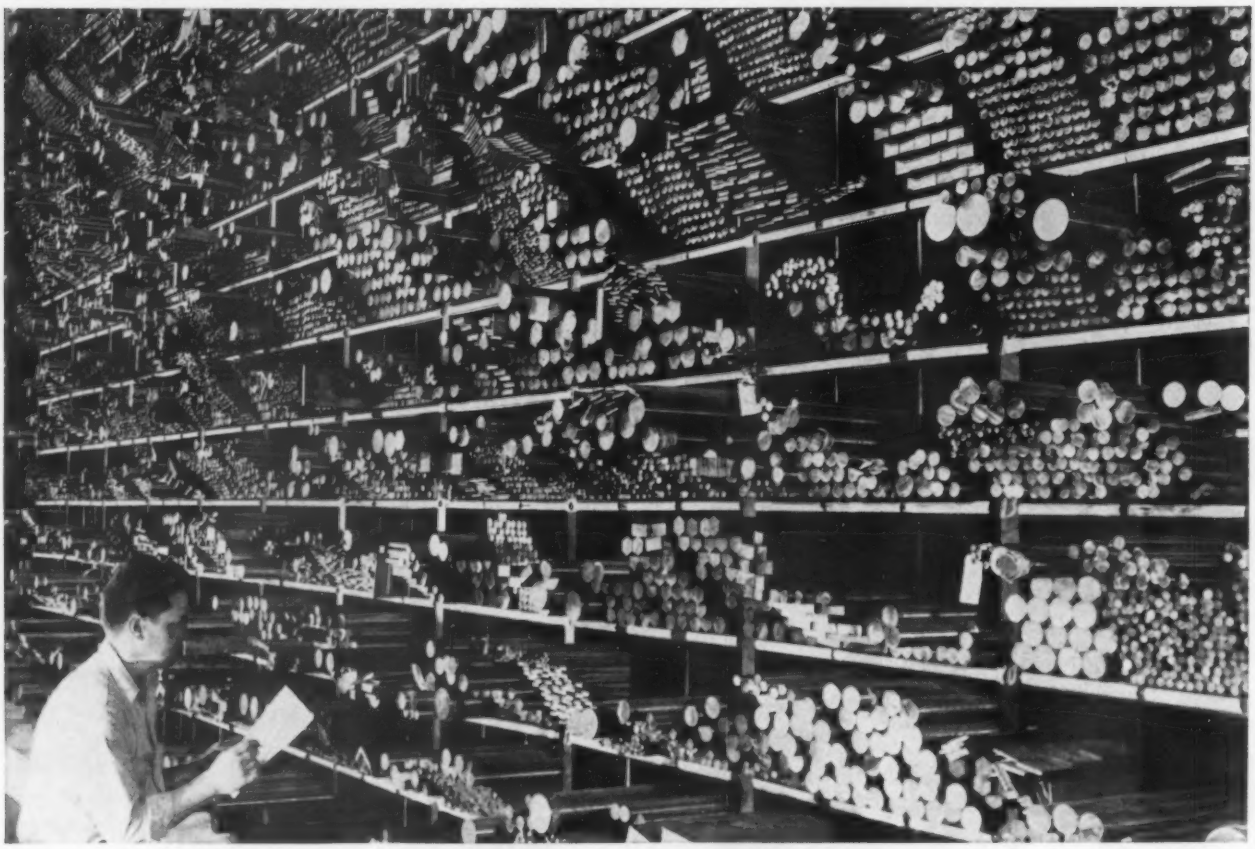
T-J Cutters properly designed and heat treated for high speed work in tough die steels.

LARGEST SELLING CUTTERS FOR TOUGH DIE SINKING

You'll find T-J Die Sinking Milling Cutters are top favorites in die and forge shops everywhere today—because they're *extra rugged* . . . produce more work between grinds! Designed for speed, accuracy and long life . . . hold a sharp edge longer . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes . . . T-J dependability! Send for new catalog 4-153. The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON

RIVITORS . . AIR AND HYDRAULIC CYLINDERS . . CUTTERS . . CLINCHORS



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Here's why we can take care of your rush requirements for stainless steel bars and wire. The photo shows only a small part of Armco's stock of stainless steel bars, ready for immediate shipment. There is an abundant variety of analyses, sizes and finishes all made to highest metallurgical standards.

You can bank on top quality in Armco Stainless Steel bars and wire. They are produced in an Armco plant that is devoted exclusively to the production of stainless steels—ingots, billets, bars and wire. The plant has a background of 25 years of stainless manufacturing experience.

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Besides finished stock, there is a large reserve of semi-finished material from which special orders can be rolled promptly. No other single plant can ship you stainless bars and wire in as wide a range of analyses, forms and conditions.

It will be worth your while to let us show you what we can do. Remember, Armco is also a major producer of stainless steel sheets and strip. Phone the nearest district office or write us at the address below.

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Besides stainless steels, Armco is a major producer of hot- and cold-rolled sheets and strip, Enameling Iron, Electrical Steels, and sole producer of ZINCGRIP, ZINCGRIP PAINTGRIP and ALUMINIZED STEEL sheets and coils. For full information on these steels just make a notation on the coupon and mail it today.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

People Too Help Boost Productivity

That increased productivity is an inevitable consequence of mechanization is an old story. Far less known, and recognized, is the deep influence of human relations upon productivity.

People as well as machines are essential to the success of any metalworking company. But people cannot be treated impersonally, as though they were machines.

Human relations is one area that, as Yale & Towne's president Gilbert W. Chapman has put it, "cannot be managed by new capital investment, by new machines, new tools, new plants, or by the most carefully laid plans."

Some manufacturers recognize this fact. They believe that employees should be imbued with a sense of personal worth. They recognize that their company's success or failure depends heavily upon the spirit pervading the work force and, in fact, the entire organization.

Management's attitude, therefore, is molded accordingly. And so-called job satisfaction follows. **With job satisfaction comes, as a natural result, a high rate of productivity.**

This conclusion is not arrived at by guesswork. It was proved, for one thing, by a study made in 1953 by the Institute for Social Research of the University of Michigan. The study went far beyond Metalworking (but included it) to seek the reasons for employee motivations.

Long ago, Johnson & Johnson, producers of medical supplies, set out to discover what it is that is basic to cooperation, teamwork and productivity. They came up with two simple facts:

1) Any person who finds out what other people want—their basic social and psychological needs—and helps to provide for those needs, can lead people into full production and full cooperation.

2) All people have social, psychological and emotional wants, no less intense and no less demanding in their requirement for satisfaction, than the demand for food or sleep. These needs are those of belonging, recognition and security.

Johnson & Johnson believe that managers and supervisors must learn how to satisfy these needs in the daily operation of the shop if a stable, productive, cooperative team of workers is to be created.

The point is this: No matter how much you may strive for greater productivity through increased use of mechanical power, you cannot hope to attain anywhere near the maximum benefit unless and until your men are really with you.

When you plan to modernize your production techniques and to install new machines as replacements for old ones, you also should examine your human-relations policy to make sure that it is modern too.

"No matter how advanced our technology becomes," to quote Mr. Chapman again, "human beings will always remain basically the same. They will give as they are encouraged to give. They will be loyal if they are given loyalty."

That brings us once again to the wise, and perhaps startling, belief of James F. Lincoln of the Lincoln Electric Co. He is convinced that **if we can solve our human-relations problems, we can expect as much improvement in products and in production costs the next decade as we have made in the past quarter century through technical, mechanical and engineering advancements.**

Burnham Finney

Only accurate forming could solve this problem...

Note the clean straight lines of the moldings formed on the Cincinnati Press Brake.

Photos courtesy of E. O. Bulman Mfg. Co., Inc., Grand Rapids 2, Mich.

The long steel shelves of these sectional display racks are formed so accurately that sections match perfectly with lines straight and clean.

The Cincinnati Press Brake is forming to such close tolerances that a masking strip previously used is eliminated. A production increase and no discards has materially reduced costs while product was improved.

Write for the New 72-Page Cincinnati Press Brake Catalog.

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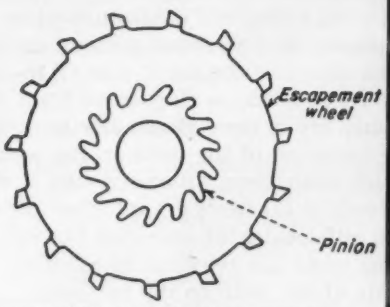
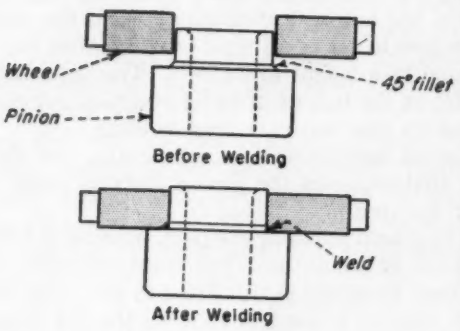


Escapement Wheel and Pinion Assembly



Ring weld your small assemblies

A shouldered shaft or a part with a hub can be joined to a mating part, with a heavy-duty spot welder. Remington-Rand devised this new method while developing a process-improvement program that saves $30,000 per year on one small assembly alone

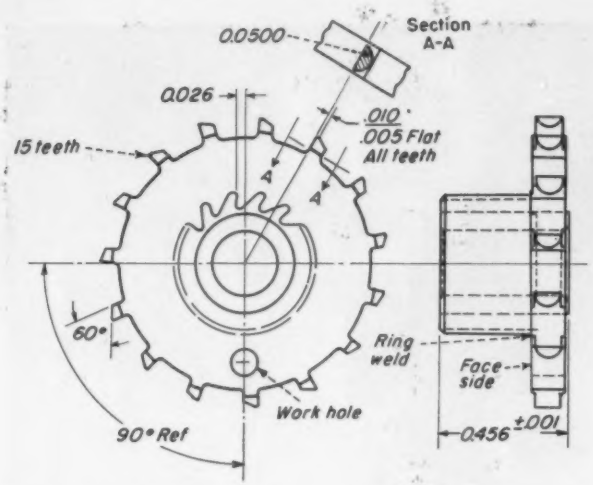
As told by
J M ENYEDY, superintendent of manufacturing
Elmira Plant, Remington-Rand, Inc
to RUPERT LE GRAND, associate editor

Ring welding, a resistance-welding method devised by Remington-Rand engineers, bids fair to replace brazing of many small-parts assemblies. Problems in subsequent heat-treatment are avoided.

In ring welding, as used at the Elmira plant, localized heating to welding temperature is achieved by restricting current flow in this manner: The edge of the hole in one part, say an escapement wheel for a typewriter, must be kept sharp. The piece to be inserted, a pinion with a hub, has a 45° fillet at the junction of hub and body. At loose assembly in a special welding fixture, the fillet and the sharp edge of the hole are the only portions of the two pieces in intimate contact. Application of current and pressure melts the restricted contact areas of the two parts, the pressure mashes them tightly together, and a ring-like weld is produced. Strength of the weld is adequate for many purposes.

Note: A good weld cannot be secured if the hole is countersunk; it must be sharp, although the edge of a pierced hole will do.

Fixture design plays an important part in the success of the



PINION TEETH must be radially located with respect to escapement teeth. This is taken care of in welding fixture. Work hole is essential for locating purposes when hollow milling the escapement teeth

ring-welding operation. The escapement-wheel assembly must be made so that a definite relationship is retained between the position of the escapement-wheel teeth and the pinion teeth (these are actually ratchet teeth). Therefore, two nests are used in the fixture. Both nests are made of 0.073-in.-thick plates of carbide, to provide wear and heat resistance.

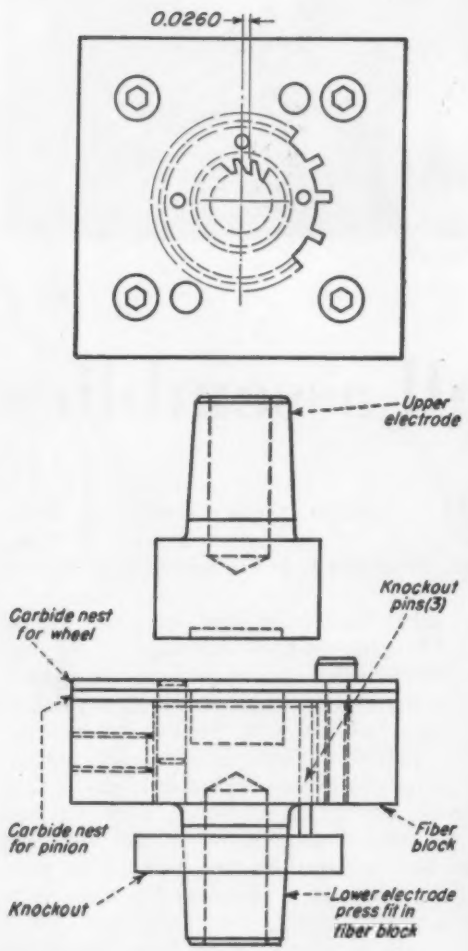
The carbide nests are made in the Elmira toolroom, using a Sheffield Cavitron machine and sample workpieces, in the same manner as reported for making carbide "kneading" dies (*AM*—Aug. 30, '54, p85). These nests, as they come from the Cavitron machine, are a close fit on the part. To facilitate ready insertion of the parts in the welding fixture, and still align them, all except two or three "internal" teeth in the nests are removed. The hub on the pinion self-locates the hole in the escapement wheel, but the nests are required to establish radial relationship of the teeth on the two parts.

The end of the pinion hub is below the rear surface of the assembly before ring welding. After welding, the hub end protrudes beyond the escapement wheel to act as a thrust bearing, after the step is ground to a height of 0.010 in. The tools and the 45° fillet on the hub must be figured to accommodate the pushup that occurs during welding.

To avoid misdirected current paths, the fixture recess that receives the pinion body is lined with a fiber bushing.

Welding heat expands the part, making it difficult to pick out of the fixture. Therefore a knockout ring with three knockout pins is fitted to the lower member. A magnet is used to pick up the hot piece, to avoid burning the operator's hands.

Ring welding affects heat-treating problems and the operational sequence for making a part. In the



WELDING FIXTURE has two nests made of carbide. One nest locates the pinion; the other, the escapement wheel. Knockout releases heated assembly

HOBBING the escapement teeth, including the 60° clearance, saves a grinding operation, is nearly 18 times as fast as form milling, and produces a uniform tooth shape

case of the escapement wheel and pinion assembly, both parts must be hardened. The original processing method called for copper-hydrogen brazing of the assembly at operation 8. (See "Comparative Operations on Escapement Wheel"). Brazing requires good fitup. Hence, the end of the hub was spun over at assembly, operation 7, to hold the two parts tightly together. Then, prior to hardening, operation 13, any excess copper had to be stripped from portions of the work to be carburized.

By ring welding the assembly, the staking operation is eliminated; likewise copper stripping.

COMPARATIVE OPERATIONS ON ESCAPEMENT WHEEL

OLD METHOD	*NEW METHOD*
1. Form, drill, ream & cutoff	1. Form, drill, ream and cutoff
2. Mark on side	2. Grind to thickness
3. Grind both sides	3. Burr ground side
4. Mill escapement teeth	4. Hob teeth
5. Spot, drill & ream work hole	5. Burr edge of teeth (one side)
6. Burr work hole	6. Assemble and ring weld
7. Assemble to pinion	7. Drill work hole
8. Braze	8. Burr work hole
9. Ball size shaft hole	9. Grind 0.456-in. dim
10. Hollow mill escapement teeth	10. Hollow mill teeth
11. Grind 60° angle on teeth	11. Harden
12. Grind face of teeth	12. Ball size shaft hole
13. Harden	13. Polish
14. Polish both sides	14. Wire brush inside teeth
15. Wire brush inside teeth	15. Chrome flash
16. Grind 0.456-in. dim	16. Grind face of teeth
17. Inspect	17. Inspect
18. Chrome flash	

OTHER PROCESS IMPROVEMENTS

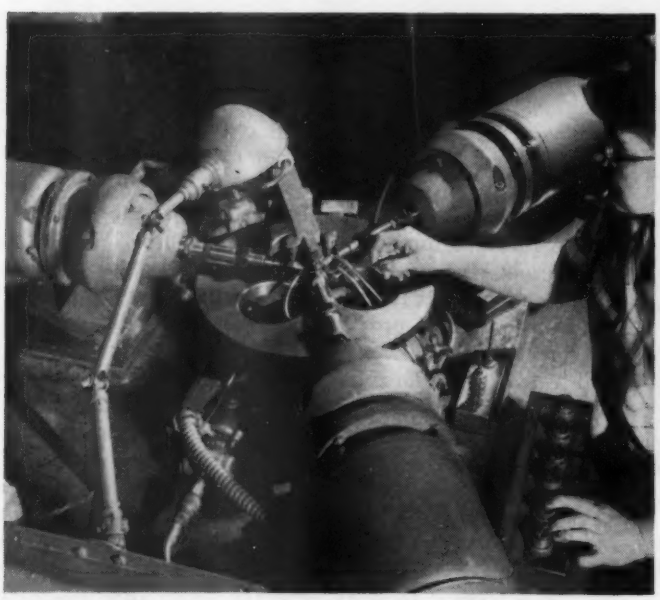
Process improvement is a continuing program at the Elmira plant. For the escapement-wheel and pinion-assembly alone, the annual savings amount to $30,000, because of improved methods in addition to ring welding. Much of the savings are realized by the new methods for producing the teeth on the escapement wheel. Originally, the 15 escapement teeth were milled on a No. 000 Brown & Sharpe, 5 pc to a load, with the aid of an index plate. The operator could achieve 400 indexes in 8 hr. Spring in the setup could not be avoided. A 60° clearance had to be ground later.

Now the teeth are generated on a No. 3 Barber-Colman hobber, 16 blanks to a load. Production amounts to 800 blanks per shift, and the operator can run three machines. The angle that was formerly ground is now combined into the hobbing operation, by using a topping cutter.

The radius on the back of escapement teeth must still be hollow milled. Originally the job was done one tooth at a time on a drillpress with the work set up an arbor. The fixture had a bushing to guide the hollow mill. To mill each tooth it was necessary to unclamp the arbor, index and reclamp. Only 170 pc could be finished in 8 hr.

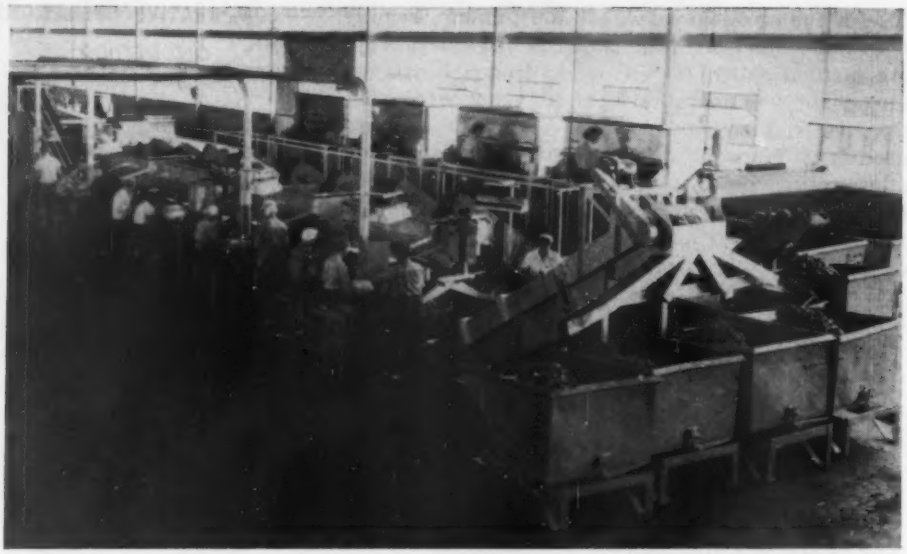
Today the Elmira plant uses a 3-spindle, push-button machine made by the Emdo Co, Detroit. The machine has an overarm to clamp the piece, an automatically indexing table, and the three heads and horizontal spindles. Three teeth are hollow milled per index. Production rate is 520 pc in 8 hr.

These process improvements are typical of the efforts expended by the Elmira plant to replace time- and effort-wasting setups with modern equipment and methods. Sometimes, a new process like ring welding is evolved. In other instances, a more productive setup is achieved, and usually one that is more attractive to labor to operate.



AN AUTOMATICALLY indexing Emdo machine hollow mills escapement teeth three times as fast as when the operation was performed on a drillpress

FACES OF ESCAPEMENT TEETH are ground on Hisey-Wolf grinder fitted with a table that has cross feed for setting work-fixture plates to the wheel plus an infeed

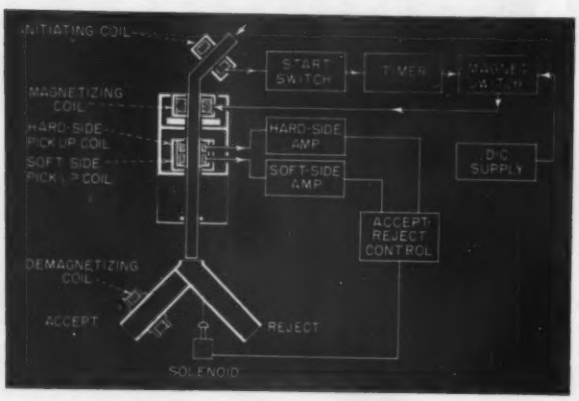


Eight hardness testers . . .
. . . (along windows) inspect more than 20,000 pc per hr. Acceptable parts are dropped onto conveyor belt, carried to girls for visual inspection, then distributed into hoppers. Each tester is double unit operated by one girl

Non-contact hardness tester sorts castings magnetically

Automatic magnetic comparator measures hardness of Arma-Steel rocker arms for automobile engines at 3000 pc per hr. Using magnetic retentivity of steel which varies with hardness, nondestructive test provides 100% inspection, rejects parts above or below preselected hardness levels. Here is another phase of automatic sensing and control

MILTON J DIAMOND, research engineer, Central Foundry Div, GENERAL MOTORS CORP, SAGINAW, MICH



Parts are magnetized . . .
. . . at initiating coil; then fall through pickup coils which trigger accept-reject controls for each piece according to preset hardness range, based on accurately Brinelled samples

How often have you wished that there was some faster way of checking hardness than the individual piece-by-piece indentation methods? Now it is possible without touching the part in any way, as long as the magnetic characteristics of the material can be forecast for any degree of hardness. While the present equipment is fairly large, the principles are established. It is likely that systems having greater flexibility, and practical for specific conditions, will develop.

Measuring hardness of small parts in large quantity production by the usual Brinell method requires grinding a flat area for the test and then measuring the depth of penetration of a steel ball. On small or precisely finished parts it often is difficult to find sufficient area for Brinell testing without making the part unusable. Even when it is possible to do this, the job is slow and troublesome. All of the test accuracy depends upon the small area indented and the skill of the inspector.

To reduce time and material losses resulting from

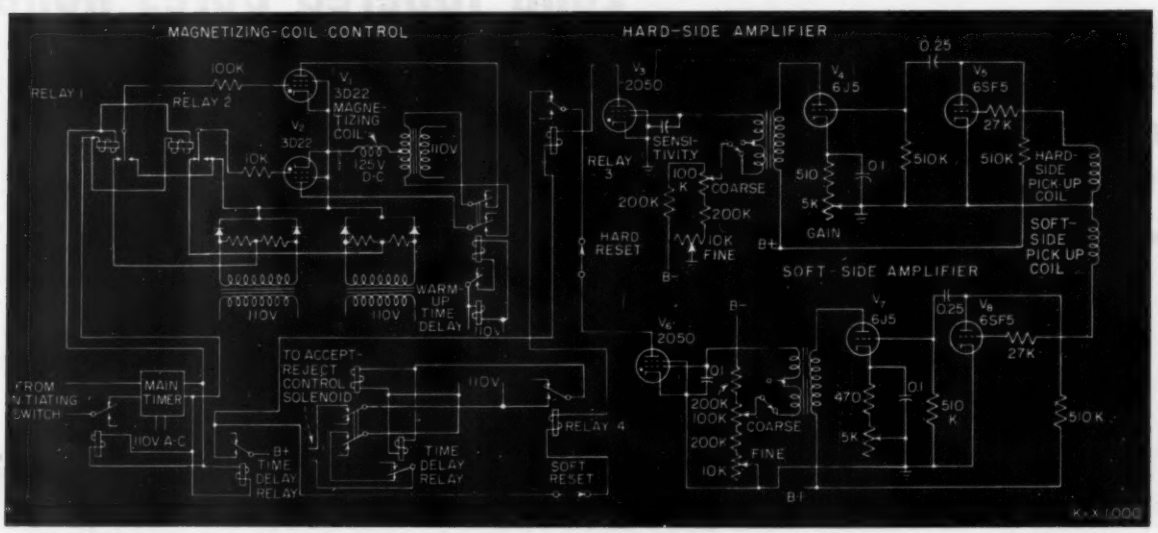
this inspection operation, an electronic hardness tester has been developed which measures the field produced, or *induced,* by a magnetized part as it drops through a set of coils. For many years it has been felt that the magnetic properties of ferrous materials could be used for selective purposes. In the early development of the tester, experimental work was done using permeability (degree of conductivity of magnetic waves or flux) as a basis for measuring hardness, but results were inconsistent. Further work showed that magnetic retentivity (ability to be permanently magnetized) was a function of hardness and could be used as an accurate means of non-destructive hardness testing.

For our purposes, the tester was set up to measure the hardness of Arma-Steel, which is made in a cupola rather than in an electric furnace, and is our trademarked name for pearlitic malleable iron. Rocker arms are dropped through a plastic tube and, as they fall through the initiating coil, each part actuates a timer which turns on the magnetizing coil. As each part reaches the magnetizing coil, the strong magnetic field pulls it to the magnetic center and the part is held there for a one-third-second magnetizing period. (Same effect as pull felt on steel part held in magnetizing coil prior to Magnafluxing.)

At the end of this time, the arm drops by free fall through two pickup coils, each coil controlling the accept-reject switch through its own amplifier system, based on the voltage-strength generated in the coils by the magnetic field of the piece. Sensitivity controls establish the upper and lower values of retentivity that will trigger the amplifiers, thus direct the rocker arms into appropriate bins according to hardness. Finally, accepted parts are demagnetized as they pass into the "accept" bin.

Setup of the hardness tester is accomplished by using "comparator" rocker arms exactly the same as those to be inspected which are previously selected for hardness by the Brinell method. A set of test rocker arms consists of a pair at the soft end of the range and a pair at the hard end of the range. One arm of each pair is 0.1-mm Brinell hardness within the allowable range and the other arm is 0.1-mm out of the range. The sensitivity controls of each amplifier are adjusted so that the two rocker arms within the range are passed and the two outside the range are rejected.

A set of test rocker arms is kept for each type of arm in production and, when changing from one type of arm to another, only a few minutes are required to make the necessary adjustments.



Construction and Circuit Operation

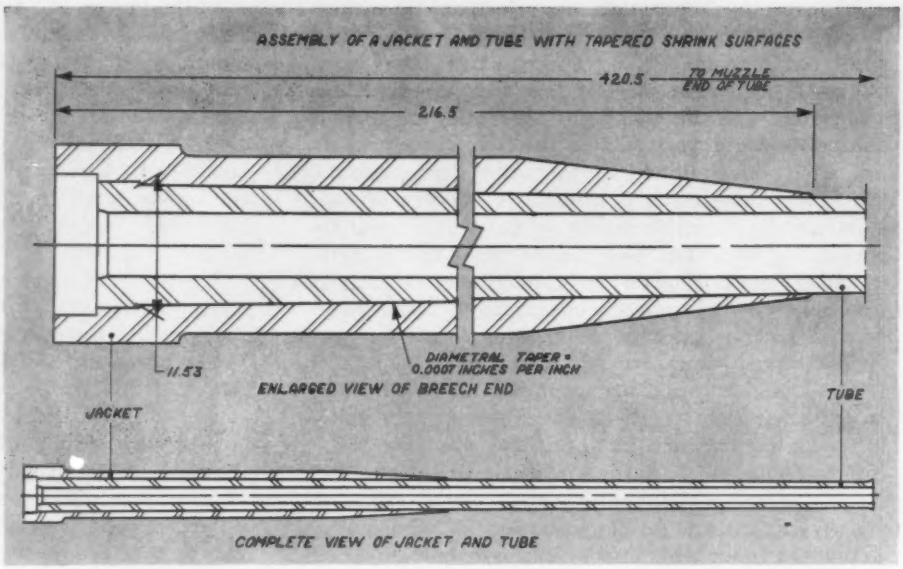
Signal produced by part passing through initiating coil sets main timer for magnetizing cycle. Timer closes relays 1 and 2, placing 110 v on grid of coil-control thyratrons V_1 and V_2. Thyratrons, operating in full-wave rectifier circuit, supply 125 v dc to coil for 1/3 sec.

Relay connected to timer output opens initiating switch circuit during this period, thus prevents cycle repeat. Time-delay relay disconnects plate supply to accept-reject control thyratorns V_3 and V_6 during magnetizing period to prevent magnetizing-coil field from causing false triggering signal through pickup coils. Normal position for accept-reject control is in reject position. Bias on hard-side amplifier is set so that thyratron V_3 will fire only when part is above upper hardness limit. If too hard, rocker arm will fire hard-side thyratron first because hard-side thyratron is placed above soft-side thyratron pick-up coil. Tube V_3 operates relay to open plate supply of thyratron V_6, making it impossible for soft-side amplifier to trigger accept-reject control. Thus control stays in normal position and rocker arm goes to reject side.

Bias of thyratron V_6 on soft-side amplifier is adjusted to be triggered by part having hardness above lower acceptable limit. When V_6 fires it operates relay 4 to set accept-reject control to accept position. Rocker arm too soft will not generate signal powerful enough to fire thyratron and part will go to reject side.

Amplifier construction is straightforward, using large valued coupling capacitors to pass low-frequency pulse, about 15 cycles per sec, produced by parts falling through coils. Amplifiers are shielded to eliminate effect of stray magnetic fields. Power is drawn from a regulated source, with separate supply to magnetizing coil, which has time-delay relay to prevent application of B + to tubes until after warmup. Another time-delay unit disconnects power to accept-reject solenoid after a short period, to prevent coil burnout if unit is left in accept position. One operator can handle two units without difficulty.

Why gun barrels are tapered ...

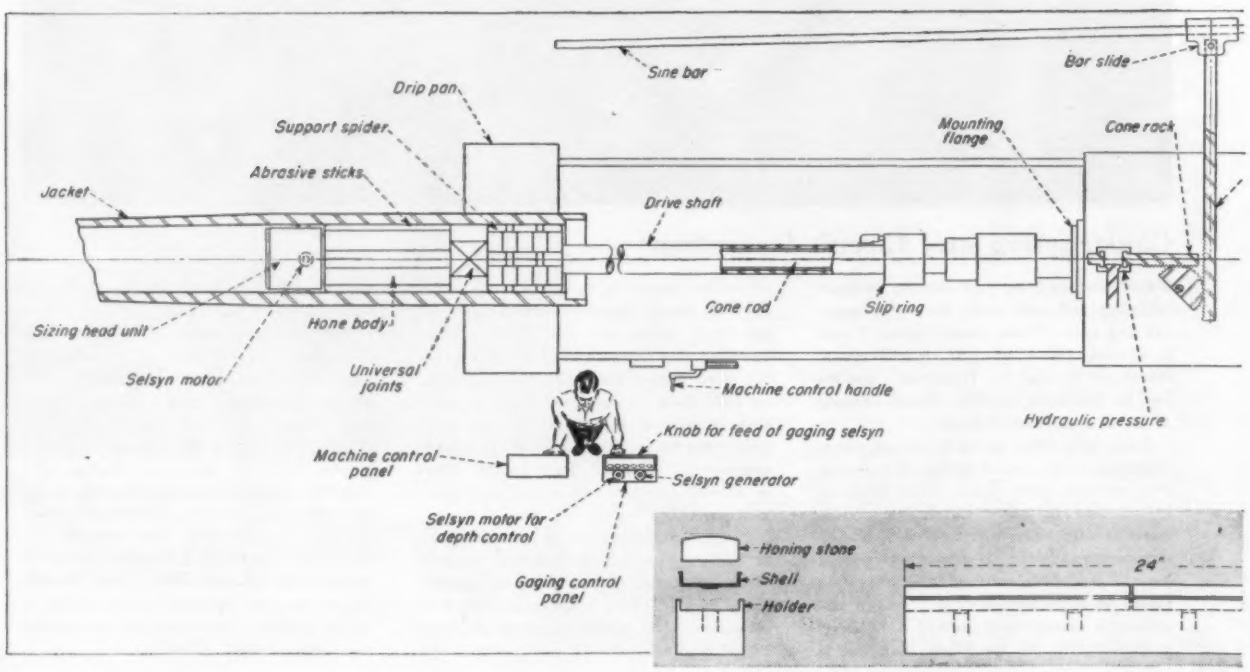


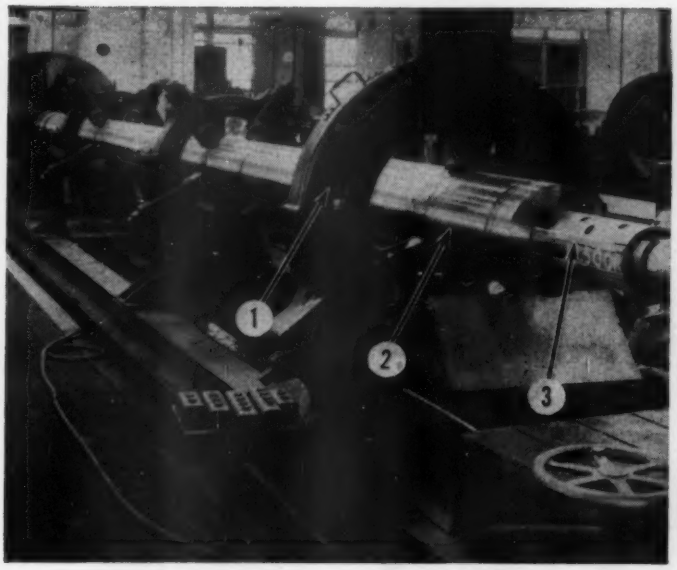
LARGE CALIBER GUN BARRELS generally consist of a jacket and tube. The jacket is shrunk on the breech end of the tube for additional strength at the firing zone. To permit removal of the jacket at any time, its ID is tapered and shrunk onto the tube which has a corresponding taper

NOW:

Long tapered bores honed

Taper honing has been done successfully — the first job being large caliber gun jackets. Here's how we achieved this "first" at Watervliet Arsenal, 60% faster and 75% cheaper than by previous methods. Taper variation is under ±0.0005 in., surface finish 30 mu in. rms. For long internal tapers, here is a new answer





BORING LATHE . . . 1 . . Steadyrest, 2 . . Gun tube, 3 . . Boring reamer

STRAIGHT, WOOD PACK REAMER . . .
1 . . Cutters located only at front end of reamer

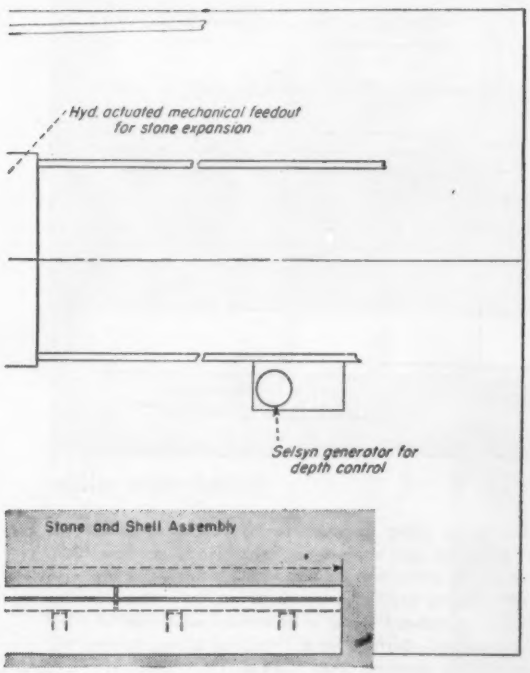
TAPER REAMER BODY . . .
2 . . Cutters run entire length of reamer on each side
in use, reamer will be wood packed for entire body, similar to straight reamer

to 'tenths'

ENGINEERING STAFF, ORDNANCE CORPS,
WATERVLIET ARSENAL, NY

Taper reaming . . .

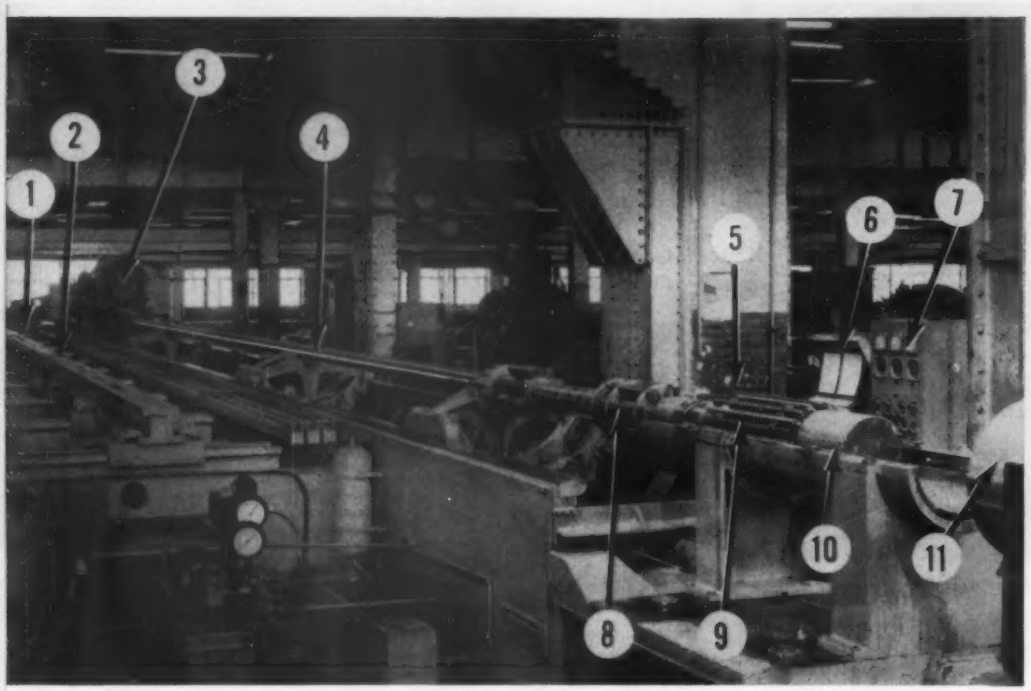
was first method devised to produce internal taper in jacket. Straight wood-packed reamers are used to remove excess stock and step-ream the bore. The number of straight reamers used is governed by degree of taper and jacket length. Taperd wood-packed reamers are used for finishing the bore. Normally tapered reamers cannot be made longer than 60 in. and a set of four or more are required. This method of taper reaming did not prove satisfactory because it produced a non-uniform taper, poor surface finish, and reamer costs and maintenance was very costly



Automatic step honing . . .

is hydraulically controlled which permits initial hone head expansion and automatic feed out during honing to bore size. Feed is controlled by a metering pump on machine head and can be set to obtain varying rates of feed as stock removal and stone wear occur. Following spider supports hone bar and also expands at same rate as hone head. Expanding members of spider are fitted with wooden bearing strips. Motorized dog, with a clutch drive, permits automatic control for reduction of honing stroke to ⅜ in. per stroke. Cycle counter controls desired number of honing strokes per cycle. It automatically counts strokes during honing, and stops cycle when number of strokes have been completed. Mechanical attachment provides control for producing a uniform taper. It consists of a sine bar, a bar slide, and a cone rack — all motions are simultaneous. Entire honing-head assembly moves forward and backward on machine ways for entire length of bore. Cone rack geared to cone rod actuates push rod — both rods are under hydraulic pressure. Motion transmitted by cone rack contracts and expands honing stones and following spider. Taper variation did not exceed ± 0.0005 in. in any 10-in. length and a true taper was generated to within 0.001 in. for entire 200-in. length of jacket

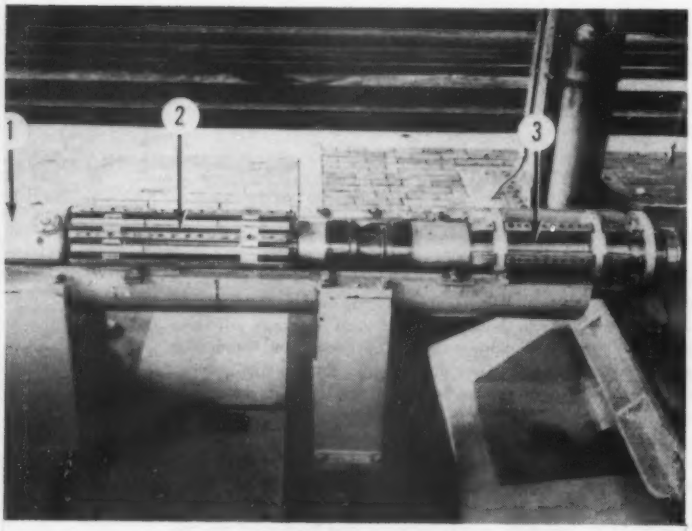
PLEASE TURN PAGE . . . ▶

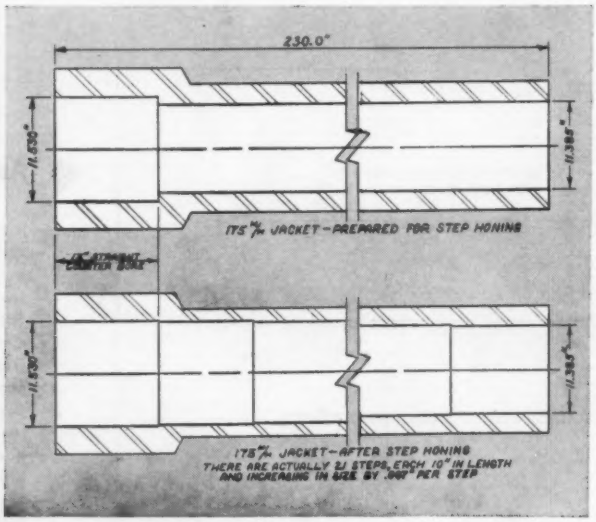


TAPER HONE MACHINE . . .
1 . . Taper attachment
2 . . Sine bar
3 . . Machine head
4 . . Hone bar
5 . . Normal operator's position
6 . . Control panel for gaging and positioning device
7 . . Machine control panel
8 . . Following spider
9 . . Hone head
10 . . Gaging head
11 . . Jacket

Advantages of honing setup . . .

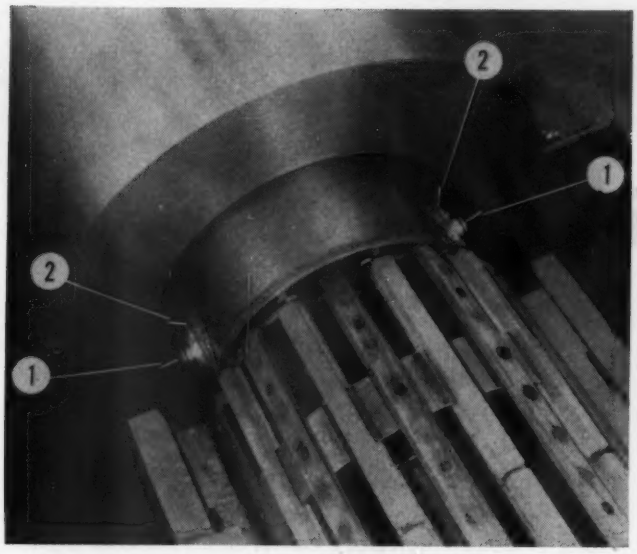
FLOOR-TO-FLOOR PRODUCTION TIME for taper honing is 40% of taper-reaming time. Unit production cost of honing is 25% of same computed cost for reaming. Another main advantage of producing a uniform internal taper is the ease with which the mating male member can be ground for a perfect fit. This is also true for subsequent use of jacket when gun tubes are interchanged. Honing machine can be readily set up for production of a great number of different degrees or diameters of tapers at low additional cost; whereas a complete set of reamers must be designd and built for each different size of taper with tool costs and time extremely high. Machine built by Barnes Drill Co, is 186.5 ft long, with head drive of 75 hp, and hones bores up to 70 ft long. Tooling, engineered and built by Micromatic Hone Corp, permits honing diameters from 8.5 to 42-in. dia. Production setup handles alloy-steel gun jackets, 19 ft long with a bore dia of 11⅜ in. Step honing required 16 hr, and taper honing 7 hr. Previous taper reaming consumed 65 hr





Taper honing the jacket . . .

from a straight bore in two operations proved to be the solution for producing a uniform internal taper. First operation was step honing to remove excess material, and second honing operation to generate finished tapered bore. Final operation in preparing jacket for roughing calls for reaming entire length of bore to 11⅜-in. Roughing operation consists of straight honing for a 10-in. step length while the stroke is systematically reduced as stock is removed. Operation begins by using normal straight honing technique for entire length of jacket, plus manual dog retraction to produce 10-in. lengths. Sine bar is connected for taper-honing operation and size is checked with gaging head at even 10-in. intervals. Three to four polishing strokes at reduced speed with manual expansion of hone head completes jacket. Surface finish called for 32 mu in. rms. but 6 mu in. rms can be obtained when desired



GAGING HEAD, SHOWING FINGERS EXPANDED
1..Gaging finger. 2..'O' ring flange

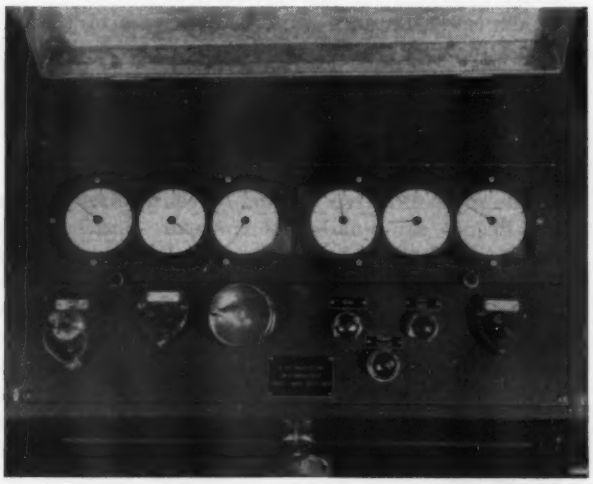
SETTING GAGING HEAD WITH SIZING RING

Tapered bore measurements ...

are taken by means of a gaging head and positioning device. Total time required to gage bore with special head is 25% of the time formerly required using a star gage. With star gage, coolant adapter had to be removed from bore everytime a measurement was taken. Newer gaging device takes measurements without disturbing work setup.

Control panel for gaging and positioning device takes bore measurements to 0.0001 in. for size, and indicating inches position to 0.100 in. at which measurement is taken. On-the-job inspection time ran 12 min. for checking both size and depth of a workpiece.

Gaging device made it possible for this one machine to do the work of two in setting up, honing, and generating an accurate tapered bore. Over-all inspection time with newer device ran 7 hr as against 28 hr with star-gage method—or a reduction in time of 75%. US Naval Gun Factory is now also interested in honing tapered gun bores, tapered rifling, and gain-twist rifling on all kinds of small and large guns for greater efficiency and harder-hitting projectiles



Positioning and gaging device ...

consists of two coordinated separate units: 1. A position gage to indicate axial distance between gage finger position and reference point. 2. An inside diameter gage to indicate diameters between 11 and 18.5 in. in three ranges. Position gage has a transmitting selsyn attached to end of spindle depth drive shaft. Rotation of shaft is reflected through transmitting selsyn to a receiving selsyn located in gage panel. Receiving selsyn is connected to a gear train and three dials which indicate axial position of gage head. Dials are set in relation to gaging fingers to show inches position at which measurement is taken. Diameter gage has a transmitting selsyn located in gage panel and is driven by a hand-operated crank. Motion so produced is indicated by three dials coupled to the selsyn. A receiving selsyn in the diameter gage head reproduces the motion and extends or retracts two gage fingers an amount equal to the dial indication. Contact with surface to be measured is indicated by a lamp on control panel which lights when a certain pressure is placed on driving knob. This pressure is sufficient to minimize distortion in measured piece. An electrical switch allows machine to run with gage fingers extended when such operation is desired

Chips produced while taper-honing jacket ...

Honing operation removed 272 cu in. of metal weighing 76.5 lb. Total stone wear averaged 30 cu in. (30 stones) which gives a wear ratio to stock removal of 1:9. Head was run at 40 rpm using a coolant consisting of 40% Union Base and 60% kerosene. Photo 30X

Does mist cooling risk operator

Is mist cooling dangerous? Many people have asked us this question because of our extensive coverage of the process (*AM*—Sept 14 '53, p 137; Aug 2 '54, p 117). Our original report stated that, without ventilation, worker health might be endangered, but some recent queries have asked for specific suggestions. We have, therefore, asked a number of experts in industrial hygiene to give us their opinions. These agree on two points:

1..There is a *possibility* of danger, but the exact nature and extent of the risk are not well enough known to say how much, and there is no evidence of any. Intensive research work would have to be done to determine the facts.

2..Although some cutting fluids are more toxic than others, any *excessive* mist (regardless of source) should be ventilated away from work area. ("Excessive" remains to be defined.)

Here, then, are representative replies (source is given where possible, but some of the comments remain anonymous, by request):

Harry F Schulte
Health Division,
Los Alamos Scientific Laboratory,
Los Alamos, N M

At first glance, the question of health problems from mist cooling would seem to be very serious. But because of limited experience, it is difficult to make an accurate appraisal of the specific degree of hazard.

Most of the discussion of danger from oil mist has centered around the oil pneumonia problem. Oil pneumonias have been caused in small children and adults by the use of mineral-oil nose drops. Relatively large drops of oil were drawn into the respiratory tract and then into the lungs, producing localized areas of pneumonia. Such conditions have not been noted among machine operators exposed to oil mist. (One case has been reported of an oil pneumonia in a worker using an oil spray to lubricate cash registers after cleaning.)*

The possibility of lung cancers from oils containing cancer-producing materials has also been considered. (See *AM*—Apr 12, '54, p 138; *AM*—Apr 26, '54, p 155). Such substances are not normally present in cutting oils, although it is conceivable that some might be formed by overheating of the oil. At any rate, there are no statistics at present indicating that lung or other respiratory cancer is abnormally high among machinists.

Because of the nuisance of oil mists, control measures usually have been instituted without measurement of the actual concentrations of oil in the air. The few measurements of such concentrations that have been made vary widely in their results. For example, one insurance company reports complaints of nuisance when concentrations exceed 5000 milligrams per cubic meter of air for petroleum-base oils, while a large auto plant has received complaints when concentrations exceeded 5 milligrams per cubic meter. Our own experience agrees with the latter figure. Wide discrepancies of this sort are to be expected, because the existence of a nuisance is also affected by other factors such as lighting, size of room, ceiling height, general ventilation, temperature, and humidity. There is a need for publication of data on oil-mist concentrations under actual working conditions.

The most effective method of controlling oil mist has been a combination of enclosure and local exhaust ventilation. In most cases, the exhaust air is passed through an electrostatic precipitator and returned to the workroom. Good maintenance is necessary on the precipitators to prevent a slow buildup of the air-concentration of oil mists. In general, the more the operation can be enclosed the lower can be the ventilation rate. Good enclosure is often desirable to contain the large oil droplets thrown off by the machine.

With this background, we can make a preliminary survey of the problem presented by the spray or

* *When he read this, Professor Drinker (see next page) made this comment:*
"He and I have every right to say that too much oil mist would be an unmitigated nuisance, and any man who has worked in a machine shop would agree. But we are in no position to tell you that the machinists are likely to get pneumonia, for the simple reason that the figures do not yet bear that out. I have talked further with friends who have had something to do with the use of lipiodol, an oily substance which is radio-opaque, and can be used for detecting certain lung trouble. They state that the evidence is overwhelming that in small amounts the lipiodol was gotten rid of virtually completely, and rather rapidly. I think, therefore, that in the cases of pneumonia in the infants, which Schulte cites, the mothers probably got a bit over-eager, and really gave them rather heavy doses, on the theory that if a little is a good thing, somewhat more will be still better."

Does mist cooling risk operator health . . . continued

health? A ROUNDUP OF CURRENT OPINION:

mist cooling technique, even though certain new factors are present which do not exist in the oil-mist problems just described. The most important is the wide variety of materials being used for mist cooling. Among other substances reportedly used are chlorinated hydrocarbons, isopropyl alcohol, soluble oil, spindle oils, turpentine, kerosene, lubricating oil, glycols, detergents, salts, dyes, and perfumes. In addition, a number of materials are defined only by cryptic numbers and letters.

PROBLEM OF SECRECY

It is understandable that manufacturers are reluctant to make public the compositions of their products of this type. With a new method such as mist cooling, such compositions will change as new information is obtained in actual practice. Many installations are made by the user, and he tries a variety of coolants.

Another new factor in mist cooling is the inclusion of dissolved solids in the coolant. Such materials build up on the tool and other parts and it is conceivable that dust, as well as mist, may be present. The use of volatile materials is also different and this presents a vapor problem.

Obviously, the most important factor in predicting the existence of a hazard is the actual composition of the coolant. Chlorinated hydrocarbons are likely to present a very serious health hazard under these conditions. Alcohols and glycols are moderately toxic; turpentine is extremely irritating; the toxicity of kerosene varies with the quantity of aromatics present; salts may be irritating or toxic; some detergents and wetting agents are quite irritating. **Hence, the hazard from each coolant must be evaluated individually. It seems certain that the coolant composition is a more important factor than its method of application, whether it is applied as a mist or as a stream.** However, use of a substance in mist form certainly does nothing to reduce the hazard.

DANGEROUS CONCENTRATIONS

It is possible to make a rough estimate of air concentrations likely to be encountered from the rate of coolant consumption and the rate of air flow. Average reported feed rates are 1.5 cfm of air, and ½ oz per hour of undiluted coolant. This will produce an air concentration at the tool of approximately 5500 milligrams per cubic meter of air. This corresponds to 600 parts per million for a light mineral oil or 2000 parts per million for a material like isopropyl alcohol. In a well-ventilated room, the concentration in the operator's breathing zone should not exceed 10% of these values. Such concentrations would not be excessive for isopropyl alcohol but might be for mineral oil. They would be excessive for chlorinated hydrocarbons and turpentine. Some of these materials are also skin irritants and defatting agents. These should be kept off the operator's clothing and skin.

From this discussion, it can be seen that certain control measures are desirable when mist cooling is used. The most important need is more information on the coolant composition. If the manufacturer will not supply the information, it will be necessary to have the material analyzed by the user or an industrial hygiene agency. No estimate of the hazard can be made without this information.

Because there is little experience on which to base a judgment of the hazard, air sampling in the operator's breathing zone is highly desirable until the absence of risk can be demonstrated.

SPECIFIC MEASURES

► **Local exhaust ventilation can be used for control** when toxic materials must be used in the coolant. Such ventilation will have to be designed carefully, however, so that the ventilation air stream does not prevent the mist from reaching the desired place of application. Enclosure also can be used to supplement exhaust ventilation.

► **Known toxic substances should be avoided completely.** Carbon tetrachloride, in particular, should not be used. This material has certain desirable properties as a coolant and lubricant, but there is no surer way of causing injury or death than to attempt to use it in mist form.

► **Protective clothing requirements should be no different than that required for normal machining work.** Skin contact with solvents and oils should be avoided as much as possible. As always, good personal hygiene is the best means of preventing skin troubles.

In summary, mist cooling is finding increasing use, and studies by industrial hygienists are urgently needed. The compositions of such coolants are likely to become more stabilized as further information is gained. There appears to be good ground for feel-

ing that under certain conditions this operation could be a source of hazard to the operators' health.

Professor Philip Drinker
Department of Industrial Hygiene,
School of Public Health,
Harvard University

I do not see any scientific support for apprehension on the breathing of oil mists, either from machine-shop work or from insecticide spraying where a gasoline-type vehicle is the vehicle.

It appears to be one of those problems we are always getting—it is easier and much cheaper to avoid the breathing of the mists (as by ventilation) than it is to determine and to define permissible mist concentrations in air. To get an acceptable answer to safe dosage (time x concentration) requires some experimental work, partly on animals and partly in studying machine-shop practice. One to two years' work would not be unreasonable. Definitely I think the suggestion of the respirator is wrong (and academic) [*AM*—Apr 12 '54, p 138]. We can ventilate successfully for confined electric welding, for numerous dust-producing jobs like granite cutting. To ventilate for mist cooling should not be difficult, impractical, or expensive. It would improve conditions if much mist cooling is used and the health risk (now unproven) would be eliminated.

OTHER COMMENTS

For one reason or another some of the experts to whom we talked declined to be identified. Here are representative examples of their comments:

. . . **First, the basic compounds** must be noted to determine what reactions they produce. Then the possibility of toxicity or other injurious effects can be established. Also, if the compound is toxic—to what degree? Although the maximum allowable concentration has been established for exposures to various toxic materials, nothing has been worked out for oil mists.

Among the many variables that make it hard to establish standards for this, is the length of exposure and concentration of the compound. A long exposure with the light concentration could be more dangerous than a heavy concentration for a short time. Besides, the concentration would vary with the manufacturer (and even that might vary from batch to batch), and also with the specific setup and operation, where a light shallow cut might use less mist or less pressure than a deep cut. Another related point is the importance of the division of a given compound. The more finely divided the compound, the more active the chemical. There is certainly a grave possibility that mist coolant—made up of halogenated waxes (waxes chemically bonded to a halogen, such as chlorine)—*could* cause trouble, but there is not enough evidence at present to be sure whether this is true or not. . . .

. . . **Controlled research** is needed before anything can be said for or against mist cooling. At every annual meeting of the Industrial Hygiene Association, the question of the possibility of injury from inhalation of oil mist comes up. No answers are ever given. Nothing is ever said to indicate that it is dangerous. . . .

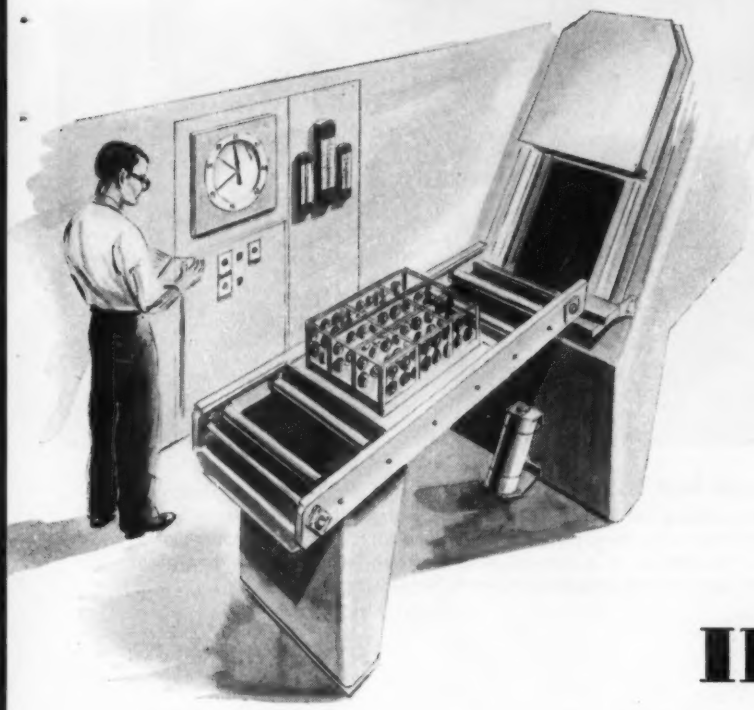
. . . **The question of ill effects** resulting from oil mist has often been raised, but there is no conclusive evidence that it actually does cause the disorders described. In fact, the question should be resolved one way or another. Whatever evidence there is of disease attributable to oil inhalation relates to pediatrics, where there have been known instances of babies suffering from nose drops containing oil. The safe way to handle oil mist is just to be sure of ventilation and not to permit overspray. However, there is no satisfactory method of determining maximum allowable concentration, or a way to test safe or unsafe conditions, because of the many variables involved. . . .

. . . **There was some concern during the war** in medical and other circles about the danger of inhalation of oil. However, no reports of lypoid pneumonia caused by this situation were made, nor have any occurred since then. In spite of the fact that no basis for alarm has been found, dispersion of air around a machine which creates or uses oil mist is considered wise, and therefore ventilation and air filtering are recommended. An MAC (maximum allowable concentration) should be worked out by checking atmospheric conditions and the comparative condition where people are exposed over a period of time, but this has not yet been done.

There is a great posibility of danger with halogenated waxes. However, a lot of research would be necessary to determine this for certain. Four deaths occurred in one plant where chlorinated wax was vaporized when applying insulation. All deaths were caused by liver disorders.

Also, there are other cases of deaths under similar circumstances. It has been established beyond a doubt (by checking with animals under duplicated conditions), that the vaporized chlorine caused the trouble. Of course this is quite different from mist coolant which, if it contains any chlorine, has a very small amount compared to the waxes which caused the trouble above. Manufacturers of coolants and users of these products should work out analysis and do the necessary research to decide the answer to this question. . . .

That's where the matter stands today. Obviously there is not enough information on the subject to give a firm yes or no answer to the question, "Is mist-cooling dangerous?" However, there seems to be a great deal of interest in finding the information needed, so it should not be too long before makers and users of cutting fluids have the answers they need in order to work with absolute safety.



American Machinist

SPECIAL REPORT NUMBER 388

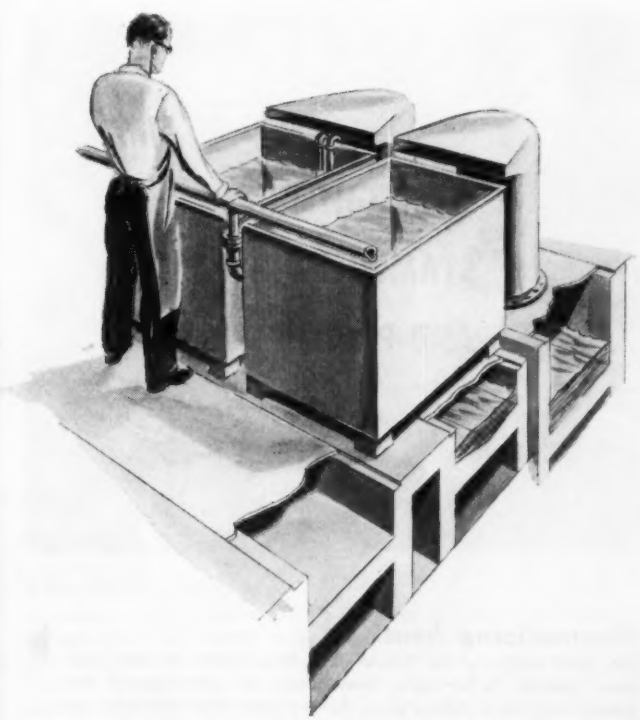
IBM

creates new ideas

for heat-treating

and plating layout

IBM at Endicott decided to do all of its plating and heat treating, in order to achieve better control of quality. This decision meant: (1) Doubling actual production, (2) replacing 50% of existing equipment, (3) allowing for a 25% expansion in five years, and (4) design and erection of a building embodying tomorrow's concepts in layout, and selection of production and service facilities. All equipment was selected by mechanical, tool and industrial engineers, together with department managers and IBM's metallurgical personnel. The bill: $6,500,000. The result: the most modern setup to date, but one that is cannily figured to get the quality IBM demands at reduced cost — and to pay for itself in maintenance savings alone in less than 10 years.



PLANT LAYOUT DEPARTMENT, Industrial Engineering Division

INTERNATIONAL BUSINESS MACHINES CORPORATION, ENDICOTT, N Y

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CUSTOM CASEHARDENING IN BATCH FURNACES

Racking benches ...

provide comfortable working conditions while preparing parts for heat-treatment in batch, belt or roller-hearth furnaces. Here, the operator is loading a rack with copper-plated parts from which the plating on a narrow, large-diameter journal surface has been machined. Exposed metal will be carburized in batch furnace

Why IBM wanted segregated

Heat treating, plating, plastic molding and powder metallurgy are now segregated in their own new structure at IBM's Endicott, NY, plant. Of ultra-modern design, this new building has two stories, measures 236 x 270 ft. All "service" facilities are on the first floor, all production equipment on the second. Both floors exhibit many new ideas in equipment and special features. These have been selected by mechanical engineers familiar with the best in shop methods and especially in manufacturing-control techniques.

Good working conditions and safe operations are uppermost in management's planning. Next to this, every new piece of equipment—every new feature

'STRAIGHTENING' STAMPINGS BY HEAT AND PRESSURE

Normalizing heat ...

plus dead weight of top fixture plate, flattens parts to IBM standards. Operator is arranging small pieces on surface-ground disk placed atop lower fixture plate. He will add more thin disks and parts in layers, then put thick disk, or weight, over center post. Parts must not have any burrs nor overhang the fixture plates

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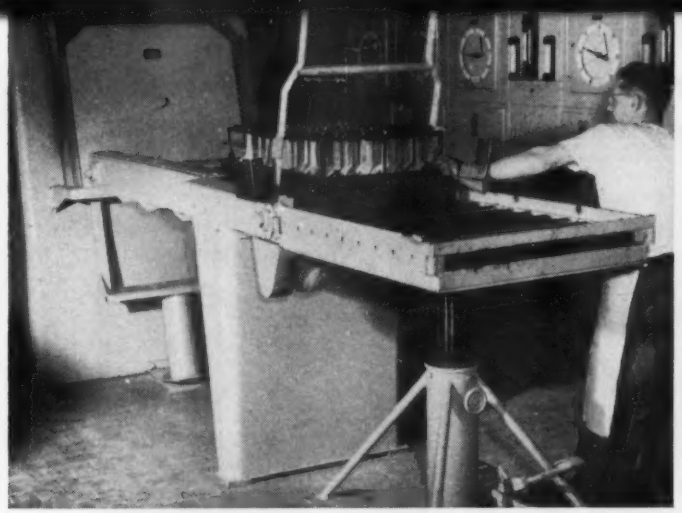
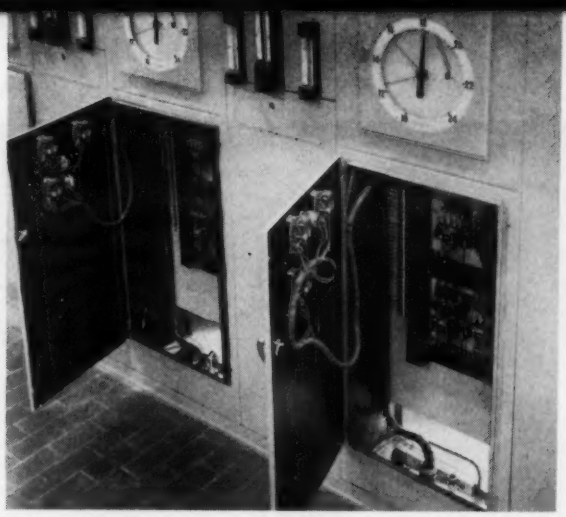


Hardening furnaces ...

a gas-fired controlled-atmosphere Ipsen of 400 lb per hr capacity is ready to receive rack of parts. Elevator (foreground) has roller surface. It is used to bring the rack from racking bench to the power-driven feed rolls at the furnace, and to elevate the load so that it an be run onto the feeder without effort



Custom atmosphere selector ...

consists of three manometers plus appropriate valves behind small door below. Operator looks at job ticket, manipulates valves in piping connected by intricate header to gas generators on first floor. After selecting the required atmosphere — bright hardening, carburizing or carburizing plus nitriding — he sets gas flow rate, purges furnace for 5 min. Actual hardening operation may take only 35 min. for thin-case work (0.003 to 0.005 in.), depending on nature of operation. Time at heat and time in quench, or cool in controlled atmosphere, can be preset

facilities

—had to pass one basic test: "Will it improve work quality?" If it could pass this test, and also reduce maintenance costs, so much the better.

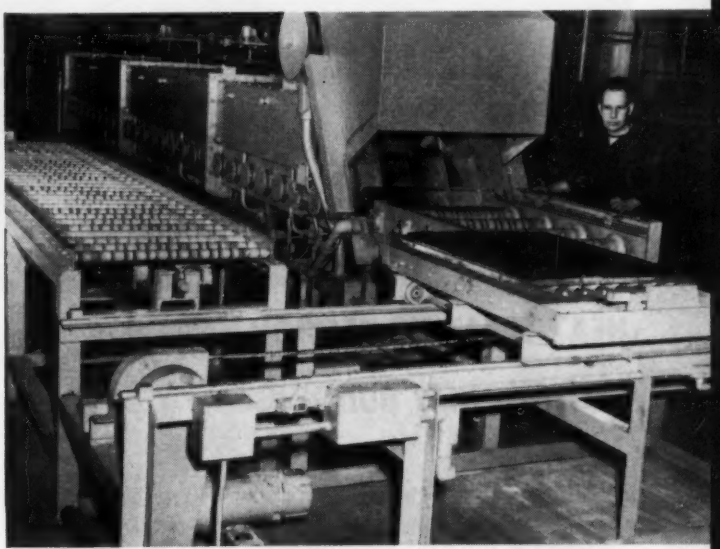
Performance, dependability and durability are requisites of every machine produced by IBM. Therefore, in design and manufacturing, the emphasis must be on quality. Heat-treating and plating are key processes in obtaining that quality.

PRELIMINARY PLANNING

In the original analysis of the problems of heat-treating and plating, it was realized that probably

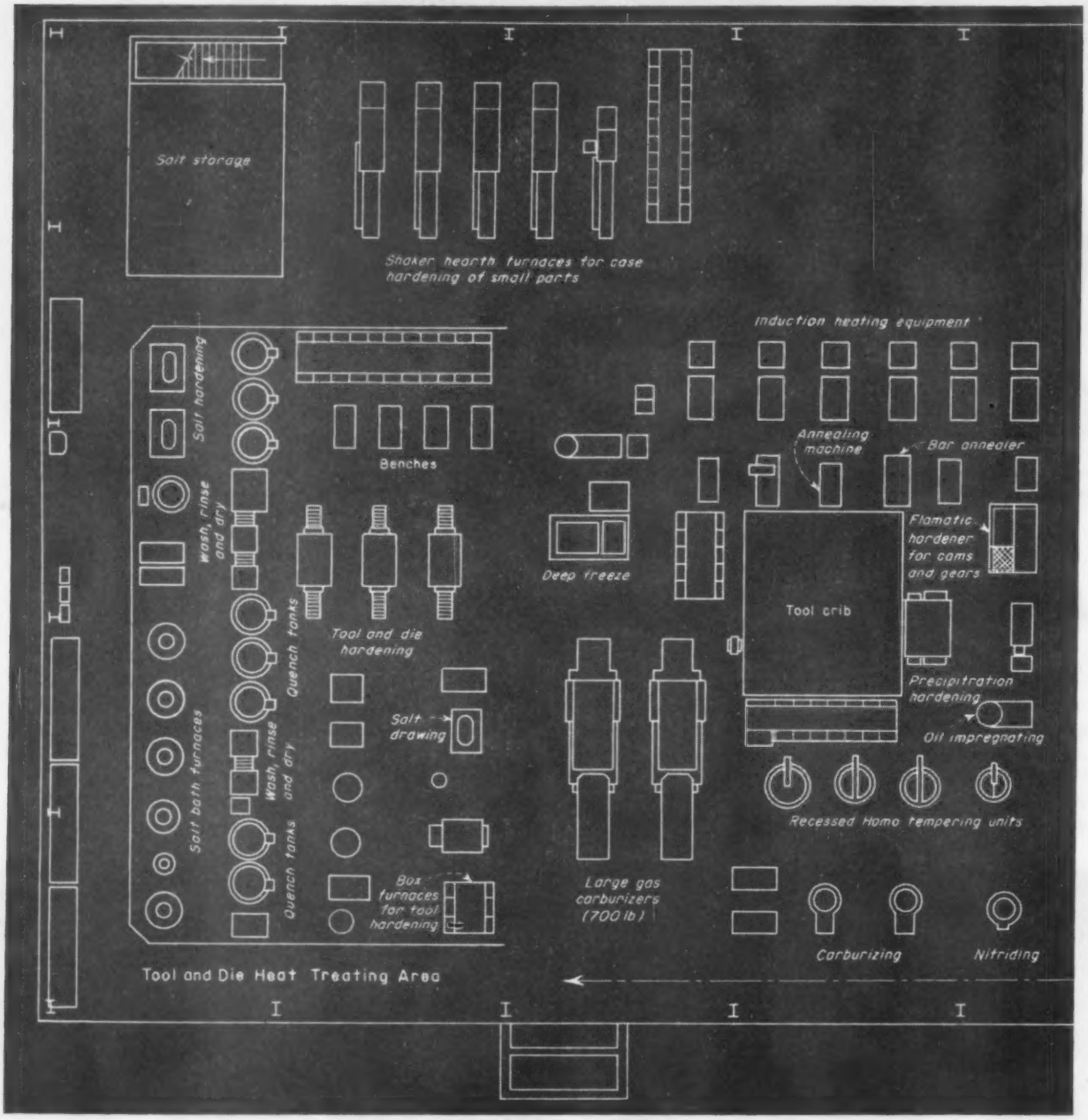
Larger workpieces ...

in this case machine endplates are placed between heavy steel fixture plates and put on an alloy rack or skid. Heavily laden racks are normally made up on the roller section of the racking benches, so that they can be slid onto the special lift truck. The truck takes the rack to the power feed rolls of the Lindberg normalizing furnace



Discharge end ...

of Lindberg 114-ft long normalizing and brazing furnace has automatic unloader that runs heated racks onto a cooling table. When furnace door opens, power driven rolls speedily discharge a rack, which runs onto the unloader and hits a limit switch. Chain drive moves the carriage to left, work strikes another limit switch. Now a shuttle bar under the cooling table pulls hot rack onto its rollers



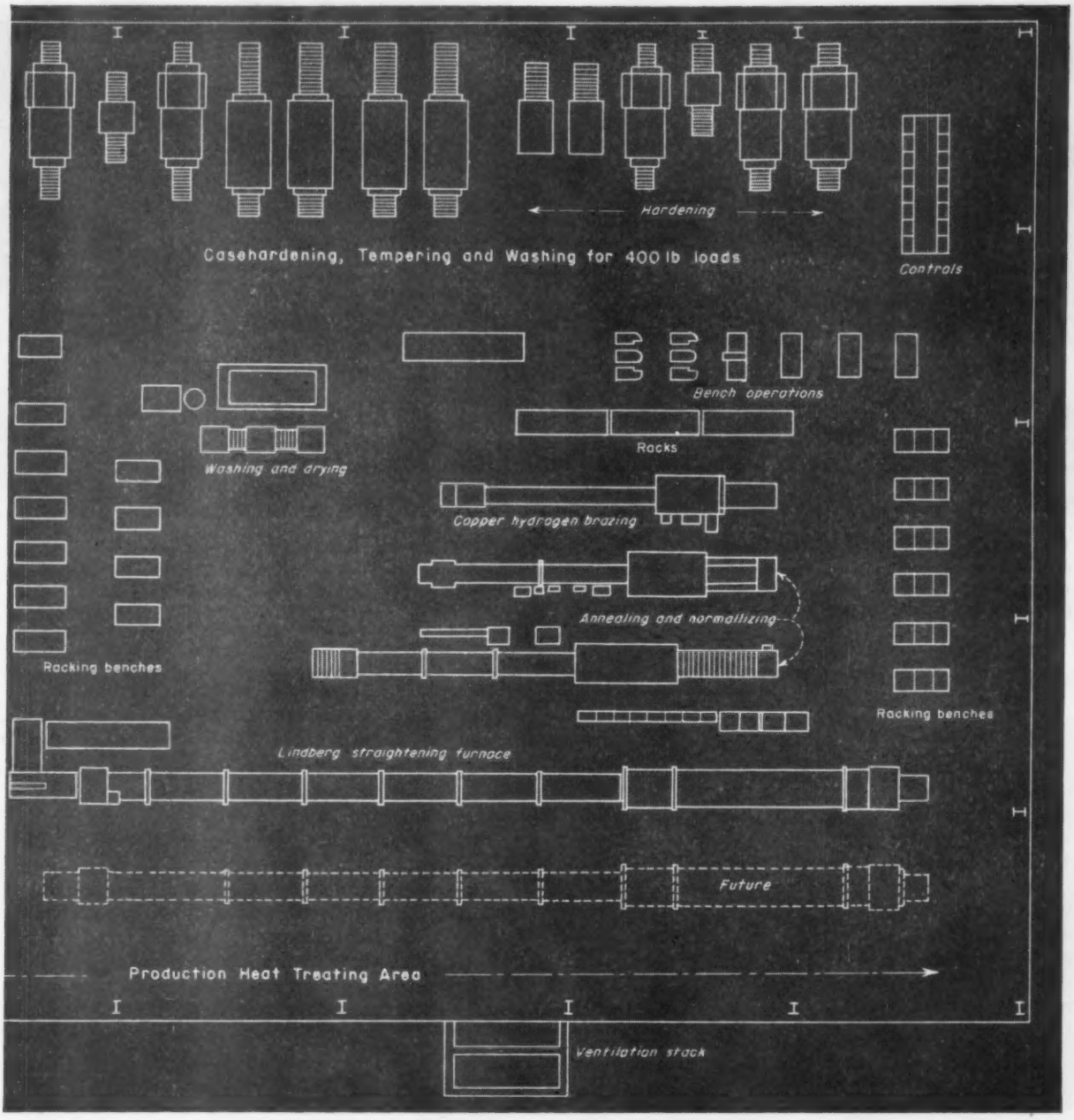
HEAT-TREATING SECTION OF IBM's NEW BUILDING

Batch operation . . .

is mandatory for most equipment in the heat-treating department, because the nature of IBM's business makes it a huge jobbing operation. Processes and equipment have been selected for cleanliness

no other two metalworking processes offer the same complexities in layout and equipment procurement. To operate, the heat-treating department must have great supplies of fuel—natural gas and electric power—plus other services. High heats and smoky atmospheres must be dispelled to maintain satisfactory working conditions. Plating, on the other hand, produces corrosive atmospheres, and requires vast amounts of water, chemicals and dc power. Exhaust-air requirements are high. Treatment of discharged process solutions is required by law and for reasons of economy.

Our problem, then, was to lay out our processing equipment and auxiliaries and to "build a building around them." Preliminary planning started with a survey of all machine units required to meet current production demands, plus units needed for expansion in the next five years. In respect to heat treatment, this meant replacement of 50% of existing equipment as unsuited by condition or type to



and safety of operation, precise control, and minimum handling of work. The "Production Heat Treating" area divides roughly into two sections: One groups induction hardening, flame hardening, batch carburizers for large work (700 lb loads), and tempering units. The other section is devoted to hardening and tempering in a line of 400-lb Ipsen furnaces, hydrogen brazing and annealing in belt furnaces and normalizing and "straightening" in a 2000-lb per hr Lindberg roller-hearth furnace

our standards for the plant, and increasing our productive capacity by 50% to handle the work formerly done by vendors.

RULES FOR EQUIPMENT SELECTION

Our guiding rules in equipment selection were:

1 . . Operator comfort and safety.

2 . . Best potential in work quality.

3 . . Cleanliness of operation.

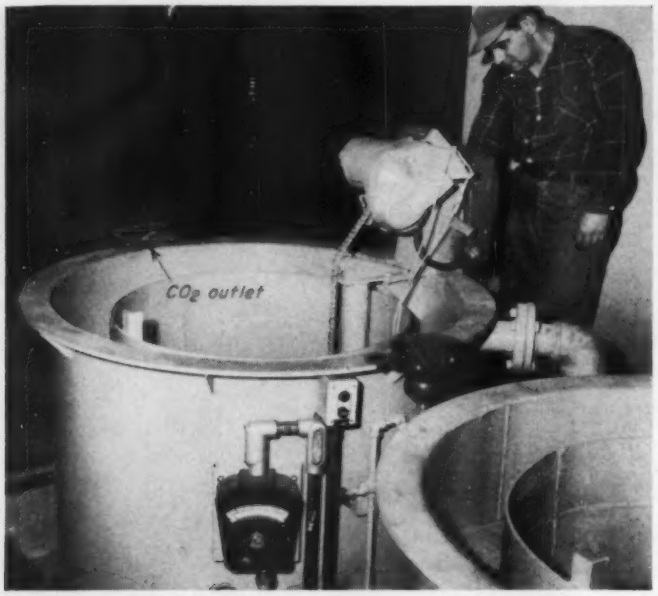
4 . . Reduction in maintenance.

5 . . Complete process control instrumentation, which can be pre-set by the operator, and which will indicate equipment performance at a glance, as a means of reducing tedious checking and adjusting.

To select equipment for the heat-treating department, we kept the above factors in mind, while placing orders. Prior to and during this stage we:

1 . . Studied production loadings for various kinds of work. As will be seen from the departmental layout (page 128) we have a large production area

Cyanide pots and quench oil tanks . . .
are set at 30-in. working height by recessing them in floor. Dike around quench tanks catches oil in case of overflow. Steel grid platform resting on steel supports is filled with lightweight concrete



Quench-oil tank . . .
has temperature indicator so operator can "dial" desired quench temperature. Power-driven elevator in tank helps operator to remove basket of work

WORK QUALITY, SAFETY AND CONVENIENCE MARK CYANIDING

and a smaller tool and die heat-treating area. From studies we determined that our production loads in batch furnaces break down naturally into 100-, 400-, and 700-lb loads. In other words, these were the loads we could accommodate on three sizes of racks.

2. . We do most every type of heat-treating, but most of our case hardening is light-case work. Therefore, we decided to abandon pack carburizing as a dirty and laborious operation. We also eliminated cyanide hardening as a production method, as far as possible, because of the danger to operators. Furnaces requiring pits were eliminated, where this could be done.

3. . Because of the availability and economics of natural gas, we decided to use this fuel as the heating medium for high-temperature operations, as well as raw material and fuel for controlled-atmosphere generators. Electric power is used for tempering furnaces for good control and utmost cleanliness.

4. . We searched the market for new ideas in equipment. For example, when we found a manufacturer of batch furnaces, who displayed particular ability to provide a clean-operating unit (no smoke when doors open and close, for example), we gave him multiple orders. Our management believes that clean surroundings have a profound effect on worker morale, and hence work quality.

5. . Much of our work must be racked. Some is strung and hung on fixtures. To speed up this work and provide better conditions, we developed racking benches, and the means to transport racks to furnaces with minimum effort. So we wanted furnaces that are easy to load and unload and with doors that open and close quickly.

6. . Where racking is not necessary, we use gas-fired shaker hearth furnaces.

7. . Our main battery of batch furnaces (400 lb per hr) is arranged for customized atmosphere selection in the hardening furnaces. A monorail conveyor behind this line transfers racks of hardened work to washers and tempering furnaces with minimum operator effort and delay.

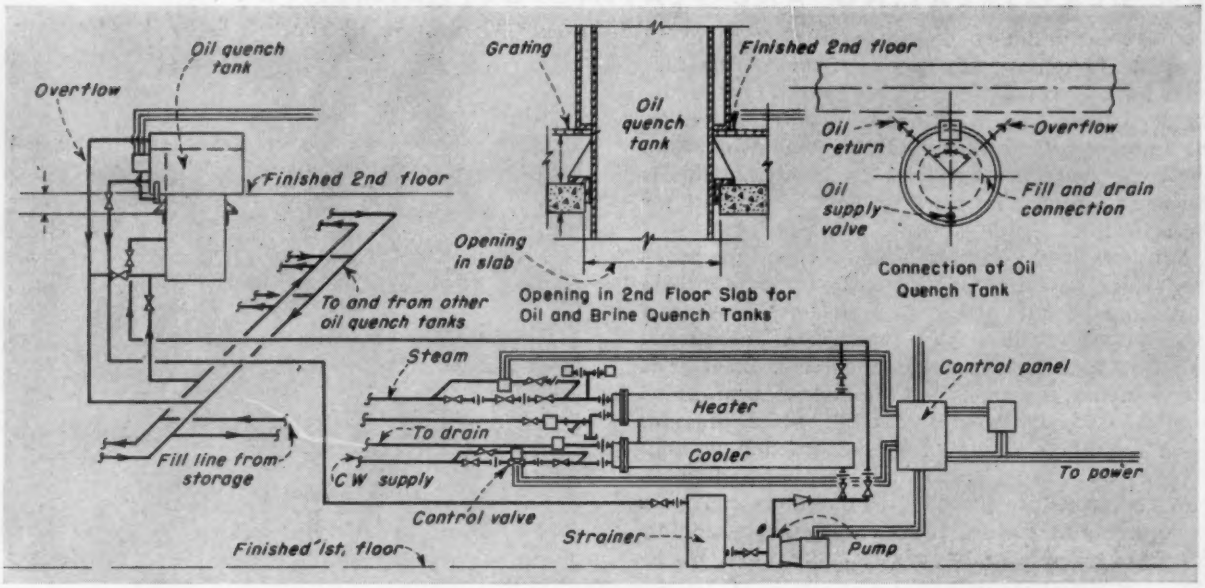
8. . We deliberately chose equipment that is oversized to the degree necessary to process occasional large parts.

9. . Furnaces are rated in pounds of work plus fixtures (the latter averaging 10% of the load) that can be heated per hour. We use three sizes of racks —24x36 in., 30x42 in. and the larger racks for the Lindberg roller-hearth normalizing and brazing furnace. In determining the physical size of furnaces as well as heating capacity, we are governed by rack size.

We do not want to rerack between operations, especially rack-carried fixtures containing up to several hundred parts. We want the load to go through the entire cycle—harden, wash, temper—without rehandling.

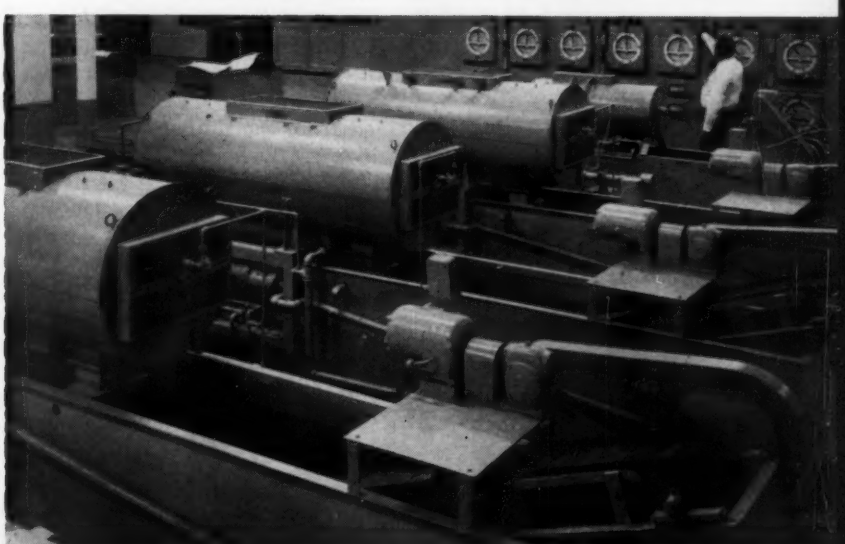
CYANIDE HARDENING LINE

For parts, tools and dies requiring cyanide hardening, a separate line of furnaces has been established. Ventilation above the cyanide pots plus a

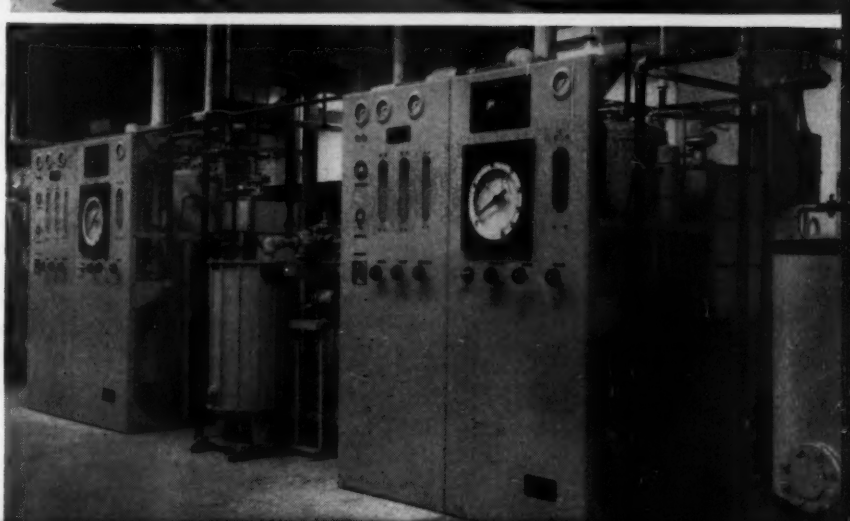


Recirculated oil ...
heated or cooled as required, and filtered, is supplied to six oil-quench tanks. System can be started before shift begins, to avoid wasted time or cold quenches. When tank temperature exceeds preset figure, the circulating and cooling system goes into action. The same applies to brine quenching

AND QUENCHING LINES



Oil-quench tanks ...
and drag-out conveyor for Hevi Duty shaker-hearth furnaces are placed in line with furnace, not in the conventional crosswise fashion. The arrangement provides a more compact setup and one that is easier for the operator to service



Two "Nitroneal" ...
gas generators (Baker & Co—Engelhard process) produce a duplex gas (carburizing plus nitriding) to two different dewpoints. These generators serve the batch-type Ipsen hardening furnaces

low circular exhaust box around each "pot" is adequate to remove any fumes. Some of the furnaces have been transferred from the old heat-treating department, but most are new. All furnaces on the line are set with an operating height of 30 in. above the floor, because tests disclosed that this is the most comfortable working level and safest for the operator.

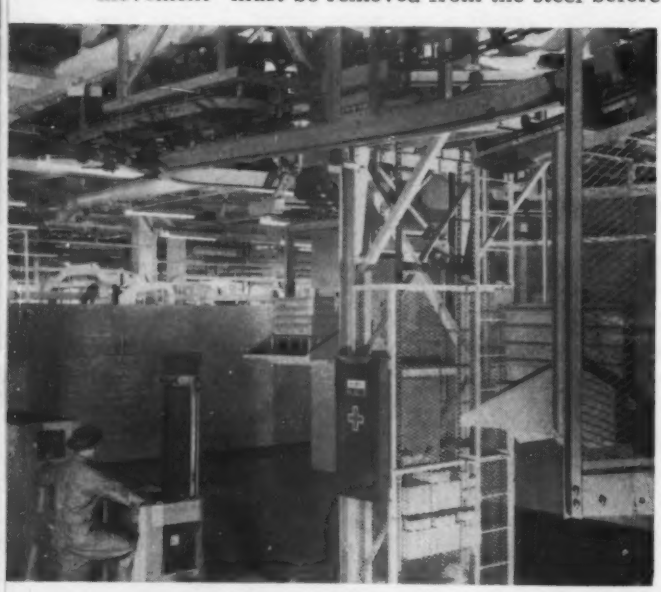
Furnaces are recessed into the floor, and the proper working height is maintained by building a platform on I-beam supports. The platform consists of steel plates about a yard wide and appropriate length to span the supporting members. Steel grids are welded to the plates and the interstices are filled with aerated, lightweight concrete, which provides a surface rough enough for good traction without slipping but not so rough that cleaning is difficult.

Wash basins are provided so operators can rinse their hands as desired to avoid cyanide poisoning. Stocks of cyanide are kept in locked storage. Workers in this area must go to washrooms or shower rooms on the first floor below before eating or leaving the plant. No food may be consumed within the cyanide-hardening department.

UNUSUAL HEAT-TREATING OPERATION

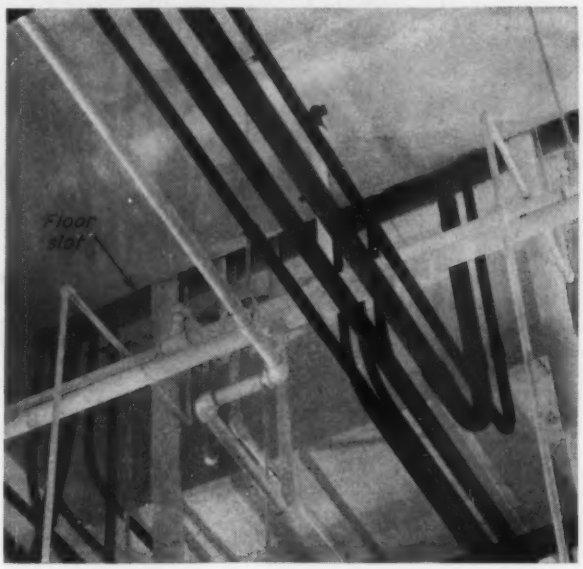
Many IBM parts are stampings or assemblies of stampings. For correct functioning in accounting machines, these parts often bear critical tolerances for flatness. For example, the amount of bowing that can be tolerated in say 12 in. is ordinarily 0.005 in., but may sometimes be as small as 0.002 in. or as much as 0.010 in.

Low-carbon-steel strip as received from the mill contains a certain amount of residual stress. All "movement" must be removed from the steel before final machining operations. Ordinary normalizing would remove the residual stresses but leave the parts in a warped condition. Conventional straightening procedures would re-introduce stresses and might be virtually impossible without a large amount of scrap, especially on work with a close tolerance for flatness.



Power and free conveyor ...

links existing machining and assembly areas with the plant, to obtain an integrated production system. Tubs or skids of parts are placed on carriers, destination preset, and will move from any one of the three locations to another. Here, the operator is lowering a selected carrier to floor level for transfer to heat-treating



Slots in second floor ...

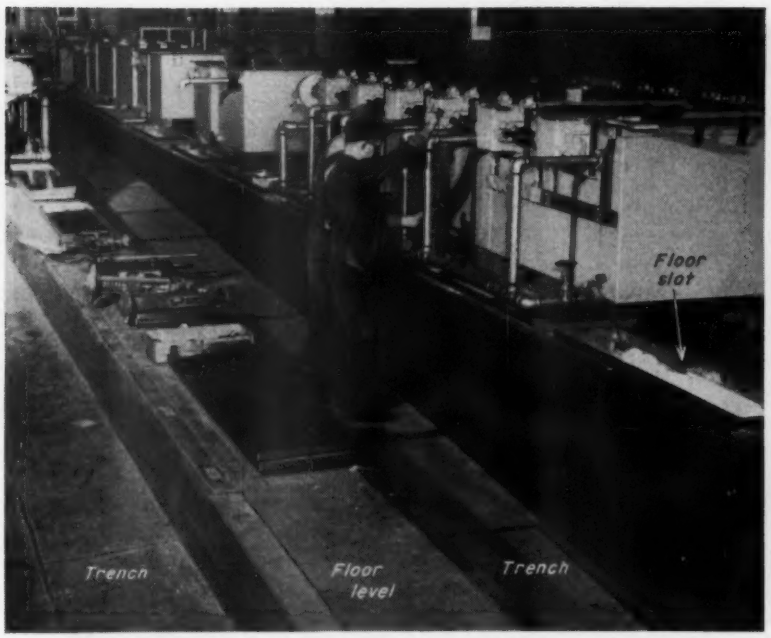
allow picking up service lines that run across the first-floor ceiling in a grid work. Power lines go through slot to switchgear inclosures on second floor, and leads to machines come down through slots, go across first-floor ceiling to sleeves in floor slab at machine locations. All servicing of facilities is done on first floor, out of the production area. Only authorized personnel can enter locked switchgear inclosures

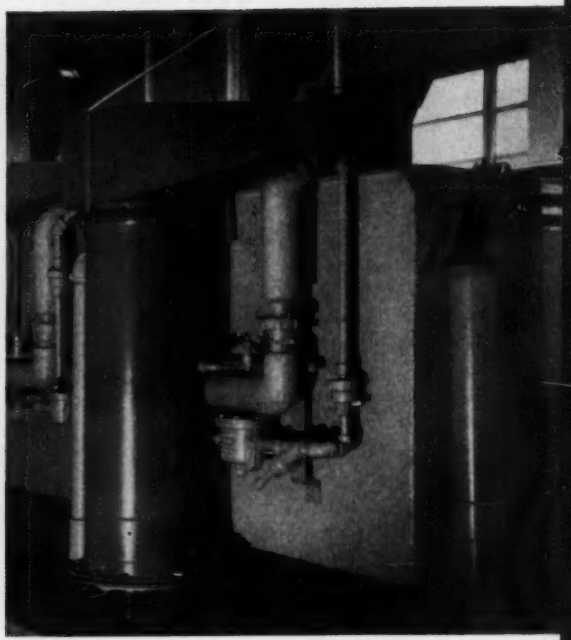
The straightening operation, as performed by IBM on blanked and pierced parts, or rough-machined endplates for subassemblies, consists of normalizing under pressure. The work is carried out in the new Lindberg 2000-lb-per-hr normalizing and brazing furnace. Temperature is 1700-1750 F, and cycle time is 6½ hr.

Pressure is applied by the upper plate of a fixture. When the work is softened by the normalizing heat, the dead weight of the upper fixture plate "floats down" the layers of workpieces to a flat stack. Powdered pumice or other inert material must often be sprinkled on the workpieces before heating to prevent the parts becoming stuck fast together.

Before loading in fixtures, all burrs must be removed from the parts. Otherwise, flatness could not be obtained.

Fixture plates are normally steel disks or plates 1 in. or so thick. The size must be such that no overhang of parts is permitted. When smaller workpieces are loaded in layers, intermediate plates about ¼ in. thick are used. Stripper stock is employed to avoid grinding to flatness before use. However, at intervals of one or more passages through the furnace, the fixture elements are checked for flatness. Any items that exceed the established 0.005 in. flatness in 12 in. are reground.





DELUXE REMOVAL OF PLATING FUMES AND WASTES

Trenches in second floor ...
remove fumes (under suction) and rinse waters, chromic acid and cyanide wastes (in separate trench systems). Still tanks rest on brickwork above floor level. Slots in floor structure provide means to connect with water and steam service grids on first-floor ceiling. Trenches are lined with Koroseal and floorplates covering trenches are coated with acid-resisting paint

Exhaust hoods ...
(plastic) are placed behind still tanks. An air screen from perforated pipe at front of tank blows fumes away from operator and toward the hood, whence they are sucked down into the trench system. Power lines to tank are protected by steel pipe

Close control demanded for plating

To achieve the plating quality required at IBM, some plating solutions must be operated on a temperature differential of ± 1 F; others to ± ½ F. Dc power in plating baths must also be held within an allowable tolerance of ± 5%. Under these circumstances, steps must be taken to enable an operation to be set up quickly and accurately, yet maintain itself with a minimum of adjustment throughout the plating cycle.

Two cogent ideas in plating-department layout have therefore been applied to insure "quality control" in plating operations. First, a master temperature-control station, located centrally in the plating area, is pre-set to govern the various temperatures required in plating baths. An operator cross checks the master control by use of a temperature indicator mounted on each tank. This allows an accuracy unobtainable in hand-operated valve systems and eliminates tedious hand operations formerly necessary. In the same general manner, a remote electrical station is mounted compactly between plating tanks. An on-off pilot light, voltmeter and ammeter are within convenient view of the operator for checking the output of dc generating equipment located on the floor below.

Second idea is the frequent monitoring and calibration of the actual temperature, not the indicated temperature, of a bath. This is done by means of a calibration station on the first, or service, floor of the building (photo, page 136). If the bath controller starts to drift, it is removed from service for repair, and is replaced with a calibrated instrument.

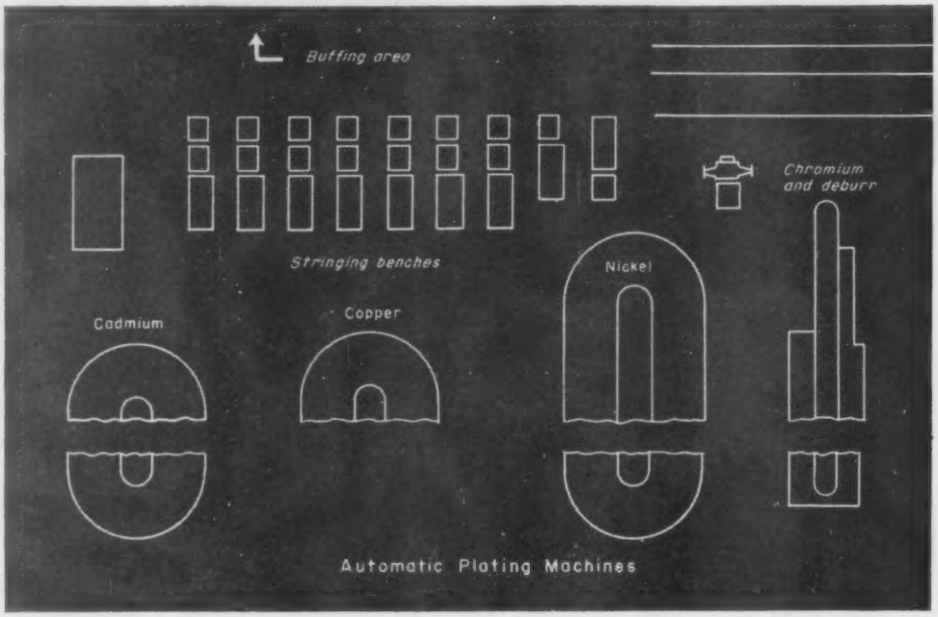
By these two means, temperature of plating can be maintained within very close limits.

Chemists in a laboratory on the first floor check strength of plating solutions and the degree of demineralization of recovered rinse waters on a frequent schedule.

Plating quality is assured for much work by considerable growth in use of automatic plating machines. Here, the operator is responsible only for loading and unloading the machine.

Employee morale and condition of equipment likewise have much to do with the quality of work turned out in a plating department. Ideal working conditions are provided by the 28-ft ceiling height, adequate natural daylight, slip-proof acid-resisting tile floors and steel floor gratings, and finally the absence of fumes and wet floors.

These working conditions are achieved by an unusual system for removal of fumes before they can



Plating quality ...

To achieve highest plating quality under precise control and with minimum attention, IBM has greatly increased its use of automatic barrel plating machines. This section, as well as the extensive still-tank area, is served by a trench system that removes plating wastes, rinse waters and fumes. Note that rinse waters flow in one direction; the plating wastes in the opposite direction

PLATING DEPARTMENT STRESSES AUTOMATIC EQUIPMENT

rise into the room atmosphere and also the removal of rinse waters, and plating solution wastes. Air curtains over tanks, exhaust hoods, and floor trenches for removal of fumes and wastes remove noxious and corrosive media to avoid annoyance of operators and destruction of building and equipment. The trenches are lined with Koroseal plastic to avoid destruction of the concrete by acid reaction, and the steel floorplates covering the trenches are given a multiple coating of acid-proof paint.

The construction of the plating-room floor is therefore an unusual and novel feature of a plating department. Because of the trench system, four "pours" were necessary to place the concrete (details with floorplan layout, page 135. Before you jump to conclusions about the costliness of this type of construction, remember that features like this are estimated to save $110,000 annually in maintenance costs as compared to the old, conventional layout now being replaced.

FEATURES OF THE BUILDING

This 2-story structure is approximately 236 x 270 ft. First floor is used for service facilities—controlled-atmosphere generation, cooling and filtration of quenching oil, power distribution, treatment of chemical wastes from plating, recovery of rinse waters, and the like. The second floor is devoted entirely to production operations. Separation of production facilities from service facilities simplifies layout, reduces maintenance costs and will aid expansion or rearrangement of production equipment.

Bays . . The second floor is divided into three bays. The outer two bays are 110 ft wide, the center one is 49 ft. One of the wide bays is used for heat-treating, the other for plating. The smaller central bay is used for a metallurgical testing laboratory, plastics molding, shop offices, and an elevator for trucks of parts received from vendors.

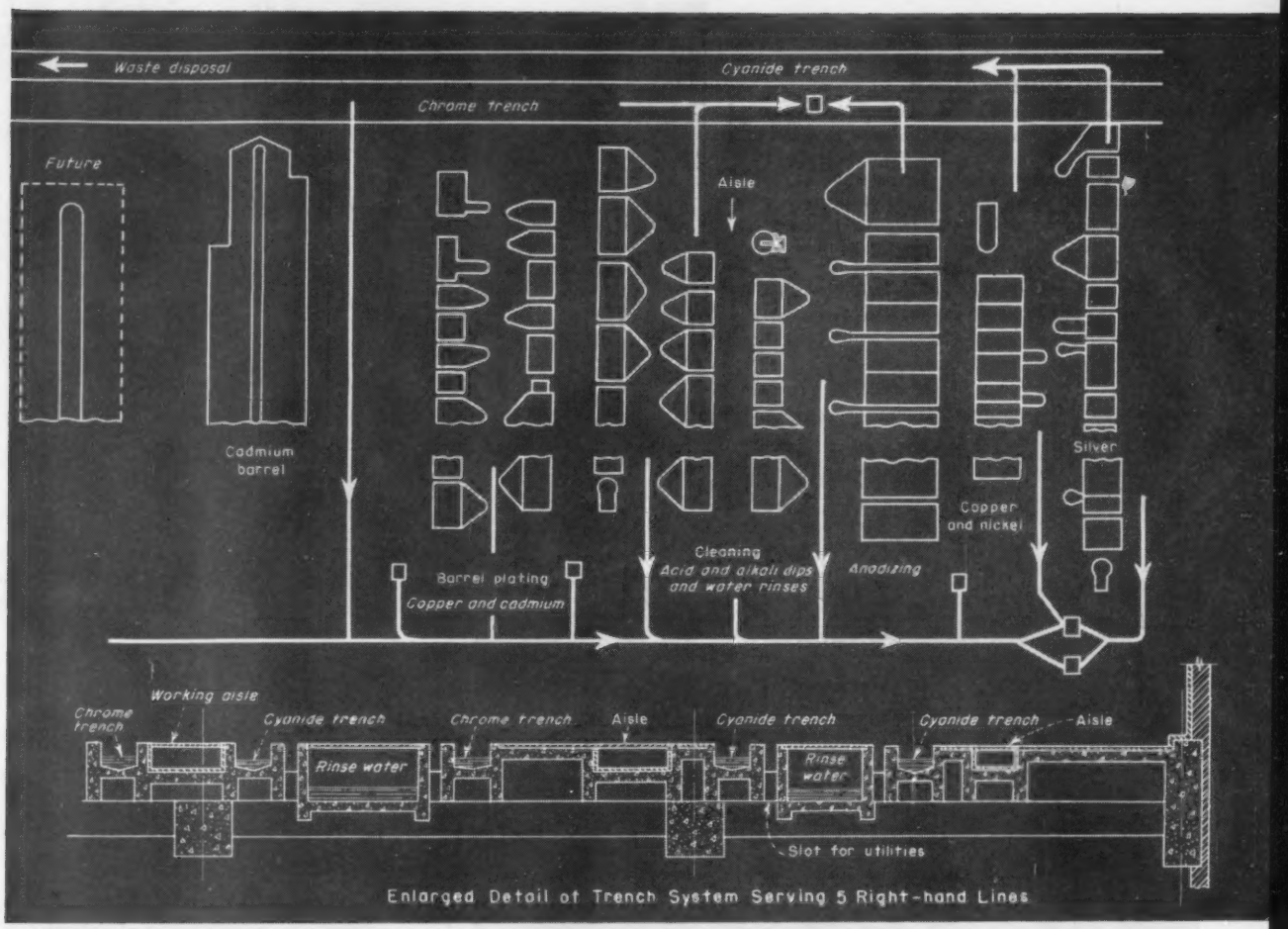
Walls and floors . . For ease of maintenance and the best possible working conditions, the interior walls of the building are finished with "eye-rest green" ceramic tile. IBM considered tile the most economical material in point of maintenance costs. Window frames are aluminum, and windows can be opened for ventilation in clement weather. A band of glare-reflecting glass block above the windows adds appreciably to the daylight admitted to the working areas.

Floor of the heat-treat department is red ceramic tile to be dust-free, easily maintained and burnproof. In areas where oil might be splashed on the floor, the tiles are impregnated with abrasive. Tile of a matching color but acidproof is laid over a Koroseal membrane protecting the concrete underfloor of the plating department.

Color Scheme . . The color scheme throughout the plant is: floors — red; walls, furnaces and other equipment — "eye-rest green" which is a standard IBM color; ceilings, long-span trusses, etc. — fumeproof white paint.

Ventilation . . Ceiling height of 29 ft on the second, or working floor, definitely improves ventilation. There is room for smoke, fumes and heated air to collect well above the breathing level and be drawn off by ducts and suction fans. These fans discharge to square stacks at midpoints of the building walls. Stacks adjacent to the heat-treating department have two flues: one goes down to a Schmieg Industries air scrubber on the first floor and the other dis-

IBM HEAT-TREATING AND PLATING DEPARTMENTS . . . A SPECIAL REPORT



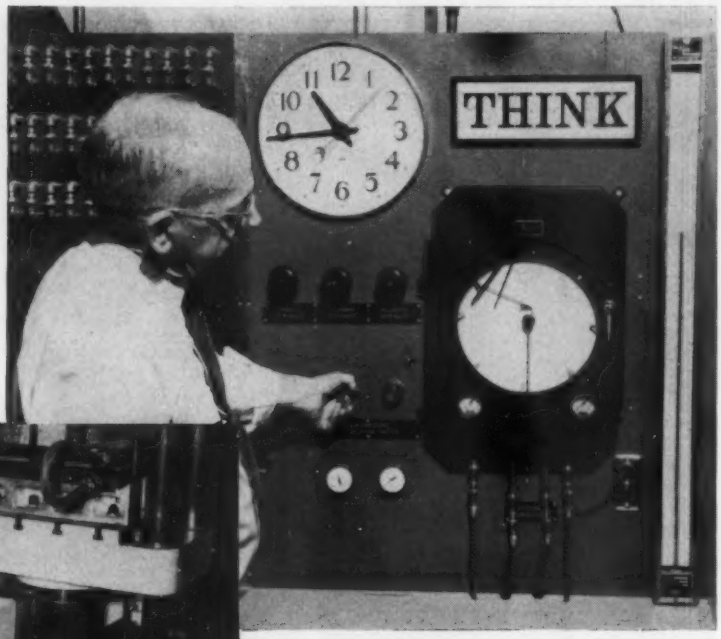
Enlarged Detail of Trench System Serving 5 Right-hand Lines

Huge plenum chamber . . .
or trench, running at right angles to trenches serving the still tanks, receives fumes and rinse waters. Chamber is lined with Koroseal sheets. Operator is making dielectric test (to copper wire buried in seam) to detect any porosity

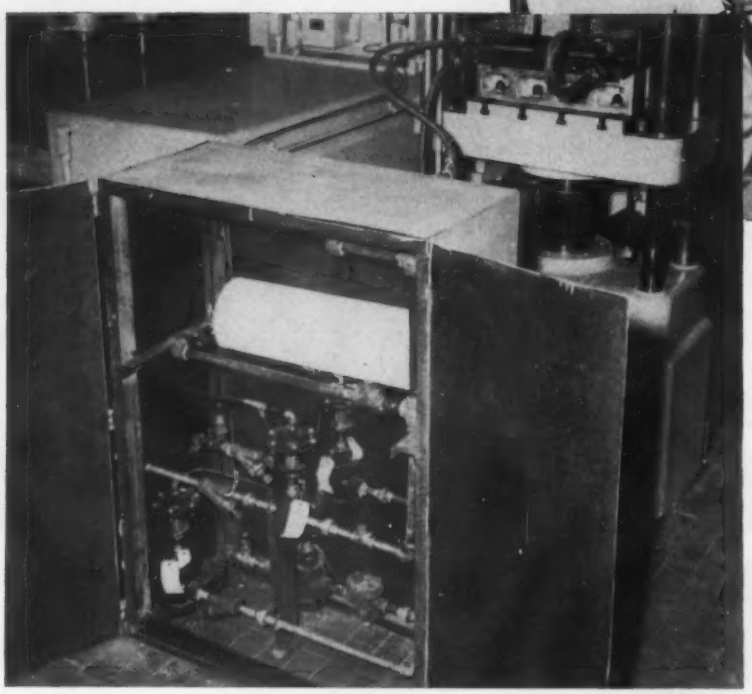
charges a percentage of cleaned air to atmosphere, while the balance of the cleaned air plus fresh makeup air, is heated (in winter only) and recirculated.

Fuel Supply . . Natural gas for firing heat-treating furnaces and for use in atmosphere generators is received by a 6-in. line, is regulated to the desired pressure and metered. The plant will use 1200 cu ft per hr. If the natural-gas supply should fail for any reason, the plant can fall back on a standby system of propane tanks.

Electric Power Requirements . . The design load of the plant is 6600 kva, which equals the power drawn by all the remaining IBM facilities in Endi-



Frequent calibration . . .
of all temperature recorders on plating equipment is important because some solutions must be maintained within 1 F and others to ½ F. Pressure in circuit of temperature-control system is proportional to temperature existing in plating bath. Hence, a bypass in air line on each tank's recorder is run to calibration station. Operator "cuts in" to monitor pressure, hence temperature, by checking air pressure with accurate mercury manometer. Any controller not operating satisfactorily is replaced and then recalibrated



Temperature control . . .
on molding press removes hazard of high-pressure steam lines at operator's station, allows him to concentrate on loading and unloading molds. Control system incorporates temperature controller and three-way valve that admits steam or cooling water to press platens as dictated by press cycle

cott. Of this amount, 6115 kva is now connected, divided as follows: heat-treating—3139 kva; plating —2976 kva. Normally, vaults would be used for incoming power lines, but to gain easier servicing, IBM chose unitized switch gear.

Power Distribution . . Power lines, 440, 220 and 110 v, are run across the basement ceiling to points below switch rooms on the second or working floor. Here a room-like inclosure, which is kept locked to all but qualified personnel, contains switches for shop equipment. The lines from switch to machine run down again through the slot in the floor and thence to sleeves in the floor at machine locations. There are no overhead lines in the production areas, except for lighting loads. The equipment can be located anywhere on the shop floor and connected to the plug-in points. All servicing of equipment power lines is therefore done in the switch houses or the grid lines on the first-floor ceiling. No power bus or duct is run overhead or in floors of the production departments.

Waste Disposal . . Cyanide, chrome and general wastes in plating-tank rinse waters are separately collected in trench work and flow to the first-floor waste-disposal system, when they are continuously treated by ion exchangers and chemical means. Water requirements of the plant are 990 gpm; hence recovery of about 800 gpm of the water by chemical treatment is an important cost-saving step. Two chemical engineers are stationed in a control laboratory on the first floor.

Wastes discharged to sewers are thoroughly neutralized in compatibility with state and local ordnances govering stream pollution.

Quench Oil . . All quench-oil tanks are supplied by filtered oil at the temperature "dialed" by the operator. Filtration, heating and cooling facilities for quench oils are located on the first, or service, floor. Not only are these facilities capable of maintaining the desired quench temperature but they also can be programmed to have the oil at the right temperature when a shift starts.

Round Table

'Sick Leave' or Free Vacation?

"I don't see why we have to let the men get away with calling it 'sick leave' when they're just taking a day off, Ed. There ought to be some way to make sure they use sick leave only when they're really sick."

"How the heck can you police a thing like that, Al? You can't very well demand a note from the doctor each time a man says he's been sick."

"Maybe that sounds foolish, but I'll bet it would work."

"What's the difference, anyhow? Each man gets five days of sick leave with pay, sick or not. If he uses it up too soon, and gets sick later, then it's his tough luck. What could be fairer?"

"It's not fair to me, Ed. For instance, I just overheard Thompson admitting that he used up two 'sick-leave' days last week to go hunting. I had to schedule work around him for those two days, and it wasn't easy. Now I find out that my effort was practically wasted because he was only playing 'possum."

"I still can't see where you have a legitimate gripe, Al. You'd have had to schedule around him if he'd been sick, too. The only thing that went wrong was you overheard him talking. Otherwise, you'd have been none the wiser."

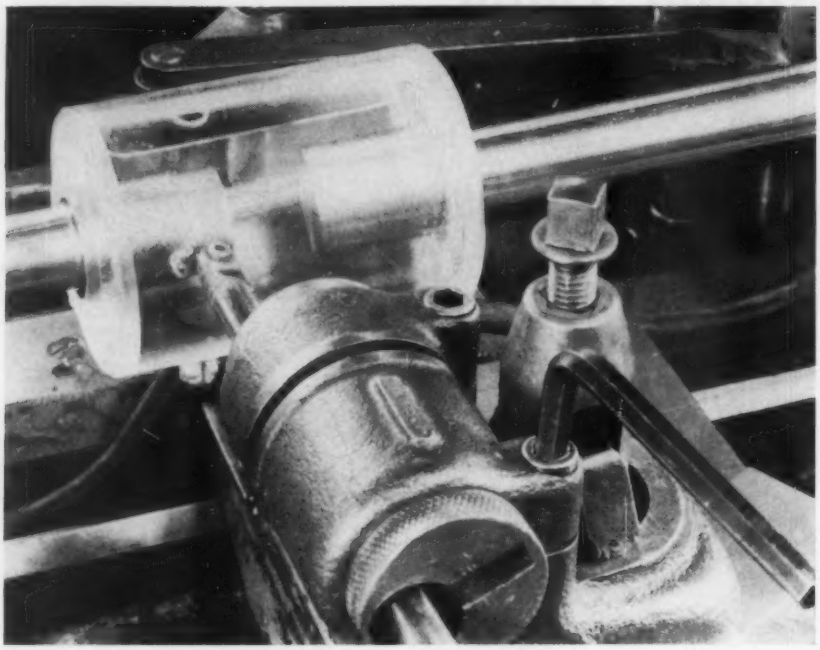
"I wasn't intentionally snooping, Ed, if that's what you're getting at."

"I didn't think you were, Al. Actually, it would be better for everyone if the men would really use sick leave for days when they're sick. They wouldn't spread around colds and fever, which only cost the company more money in lost time. But I don't see any way to make sure that 'sick leave' really means sick leave."

"Maybe we can get Harrison to talk Management into giving the men the money for their five days at the end of the year. That might cut down on this monkey business."

"And probably defeat the whole purpose, Ed. Some of these money-hungry machinists would come in if they had pneumonia."

***IS THERE** any way to police 'Sick Leave' without getting into trouble? Your opinions may guide others.* *Discussions of earlier topics start on page 180.*



TRANSPARENT PLASTIC HOOD covers uranium or other materials whose chips must be collected. It can be filled with cutting fluid or an inert gas, as may be necessary. O-ring seals opening through which workpiece, support bar and toolholder pass. This hood has fixed ends

Clear plastic enclosures catch

Lathe and drill units handle special assignments on radioactive and other unusual materials. Either a fluid or a gas atmosphere can be provided

ovel enclosures for confining special materials during turning and drilling have been developed with the assistance of Carl Munter and Russell Anderson, instrument makers, Central Shops, for use at the Argonne National Laboratory when it is desirable or necessary to:

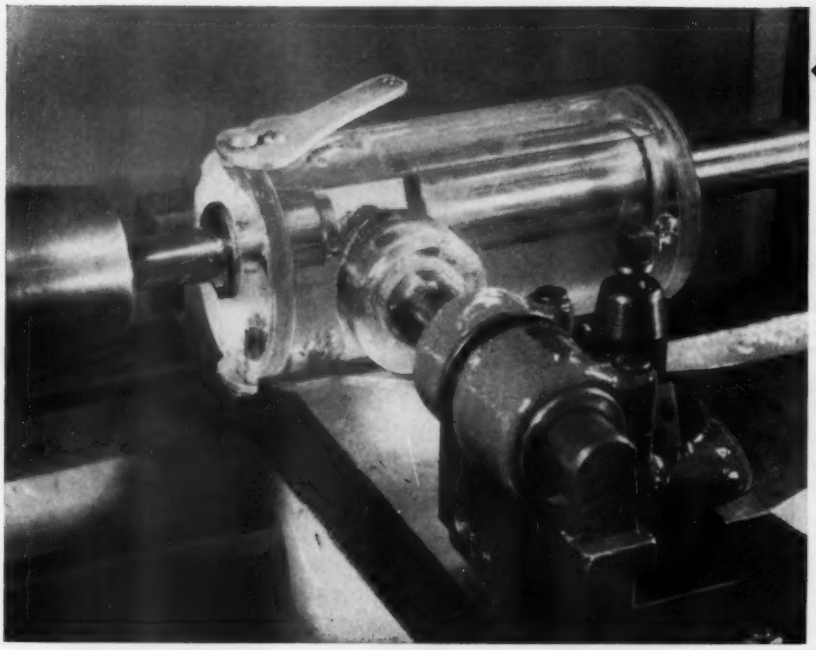
1. Save all particles of precious metals or fissionable materials.
2. Reduce fire hazards when machining pyrophoric materials.
3. Prevent the spread of contamination from fissionable or hazardous materials.
4. Collect chips for analysis.
5. Machine parts submerged in a liquid, or enveloped in an inert gas, to prevent oxidation or other contamination.

Two different types of enclosures have been devised to date, one for use in engine lathes, the other for use on drills. Both are of simple design, relatively inexpensive to make, easy to use, and, being transparent, permit close observation of work.

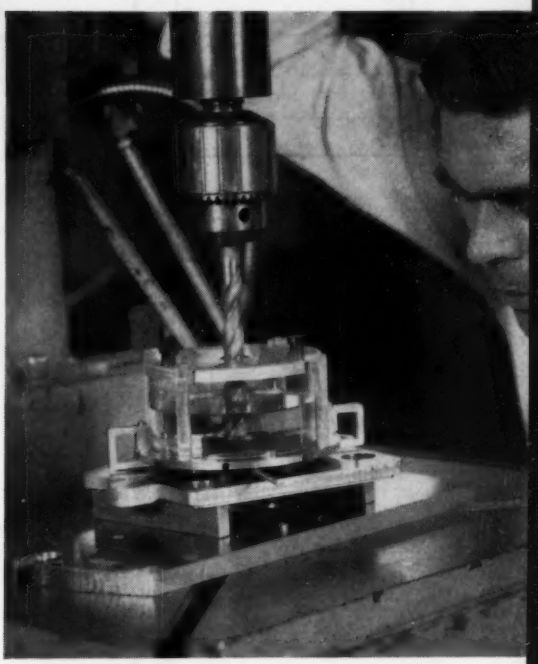
Enclosures for lathe operations are essentially ¼-in.-thick Lucite polystyrene-plastic "cans" (3-in. OD tube 5 in. long), with holes in the ends through which pass the workpiece and the stainless-steel support rod held in the tailstock of the lathe (photo). A boring bar passes through an opening in the front. All three openings are sealed against leakage of the cutting fluid or enveloping gas with O-rings. A small tapped hole in the top permits the tool bit to be tightened in the boring bar, and is also used to fill the enclosure with the fluid (usually distilled water or gas). A similar hole in the bottom of the enclosure permits liquid to be drained. Both holes usually are plugged during turning.

One lathe unit has fixed ends, made from disks of ¼-in.-thick Lucite, and is used when turning standard-diameter samples. The other, for turning workpieces of different diameters, has interchangeable front-cover disks, held in position with cammed hooks (photo).

The enclosure for drilling also can be used for small endmilling operations. It consists of a Lucite cylinder clamped between a metal baseplate and a metal cover. A sealed drill bushing and shutter are fitted to the baseplate, so the cutting fluid can



WHEN PARTS OF DIFFERENT DIAMETERS must be turned, hood with interchangeable front end on Lucite tube is used. Two cam-locks hold end plate against body of enclosure. Operation can be watched easily through transparent wall of hood when cutting fluid is distilled water



ENCLOSURE FOR DRILLING must be set up in vertical position, as clearance hole in top cover is not sealed. Here, shutter under baseplate hood is clamped directly against workpiece, instead of being threaded into hole tapped in jig plate (sketch)

"hot" chips at Argonne

NILS BOHLIN, associate mech engr, Remote Control Engrg Div
and HERBERT V ROSS, superintendent, Central Shops,
ARGONNE NATIONAL LABORATORY

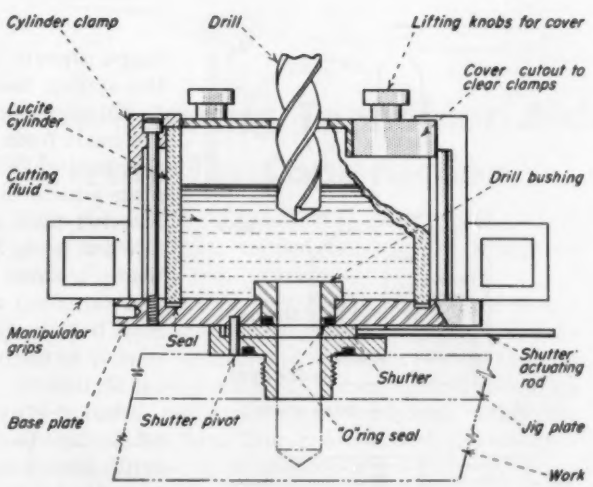
be retained in the cylinder while it is being removed from a workpiece.

For several applications, a jig plate with taper-tapped holes facilitates the collecting of sample chips. The jig plate is clamped to the workpiece, then the enclosure is used at each hole successively.

After the enclosure is attached to the jig plate at one hole, the shutter is closed and the enclosure filled approx ¾ full with mineral oil. Then the shutter is opened, the drill is started, and the hole drilled to depth. As the drill rotates, chips flow upward into the enclosure.

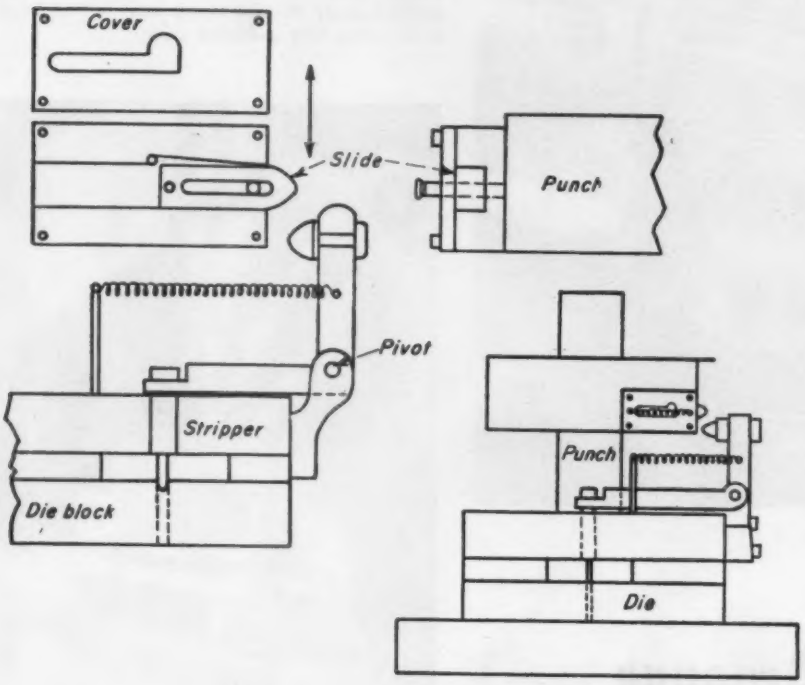
When the drill is withdrawn, the shutter is closed. Then the unit is removed from the jig plate, emptied, cleaned, and attached to the jig plate at another location. Only chips not collected are those remaining in each drilled hole when the drill is removed. In instances where only one hole is to be drilled, the shutter is clamped directly to the workpiece.

Grips in the side of the drilling enclosure permit it to be handled with remote-controlled manipulators when drilling samples from radioactive materials placed in heavy-wall caves for protection of personnel.



TWO DIFFERENT SHUTTERS are used with enclosure for drilling, one with threaded plug for use with jig plates (above) and another for clamping directly to workpiece surfaces (photo). Usually only clear cutting fluids are used in this hood, so the operator can watch drilling operation as it is performed

Practical Ideas . . .



Installed stop

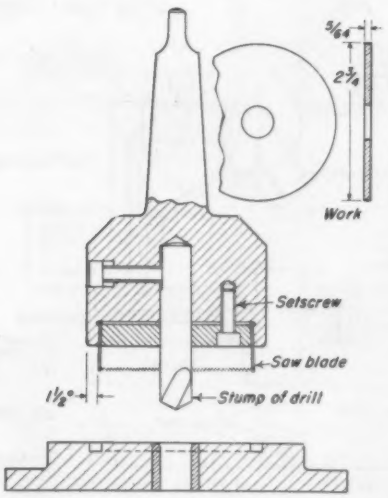
Work Stop For Press Tools Stops Excess Scrap

We were having difficulty with fixed stops on piercing and blanking operations on our presses, and scrap was high because work missed the stop or overshot it. The stop shown here avoids this trouble.

In the tool, a lever actuates the stop, and is fixed to the side of the die, to pivot and move the stop up or down. The lever is held in the down position by a spring. The cover for the device is fixed to the punch, moving up and down.

When the punch moves down, the sliding member strikes the projection on the pivot, but, because the pressure on the sliding member is upward, the arm just slides back in its slot, and the stop does not lift up. However, on the return stroke, the pressure is downward on the sliding member, and it tips up, into the angular recess, and forces the stop lever to lift the stop. This action is timed to occur just as the punch is level with the stripper plate.

The movement given to the stop is quick and steady, and to remove the work, the stop can easily be lifted by hand. *S Sharcatt, Devonshire, England*

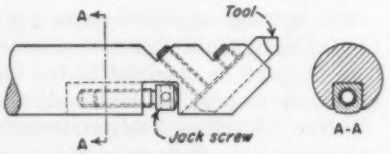


Trepanning Sheet Metal

We had an order to produce a limited number of flat washers, of the shape shown, so we devised the trepanning tool shown here. The 3 cutting portions of the tool are made from hacksaw blade, and are held in place by the conical plate which, in turn, is secured by 3 socket-head setscrews.

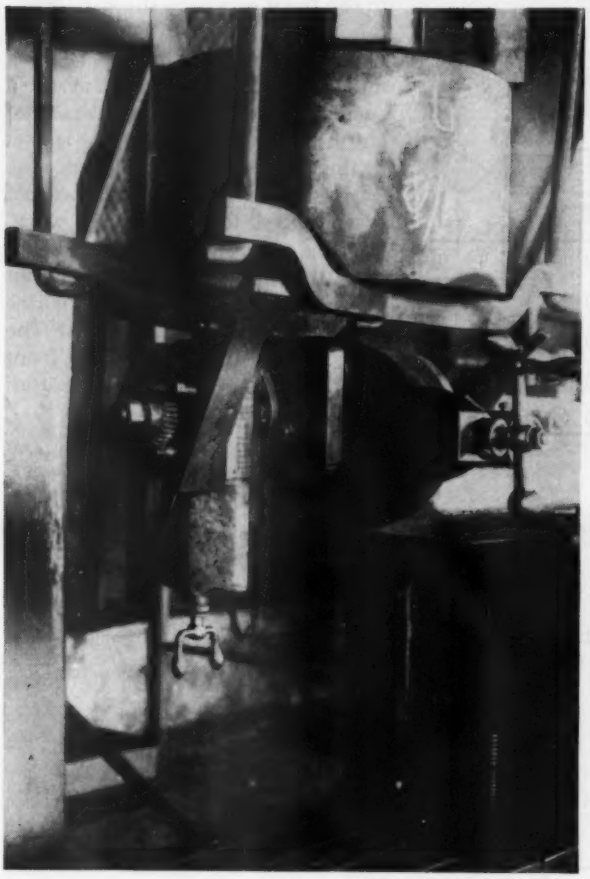
When using 3 short pieces of saw blade, a small gap is permissible, and turns out to be more satisfactory, because the short pieces bend readily to fit the shape of the conical section.

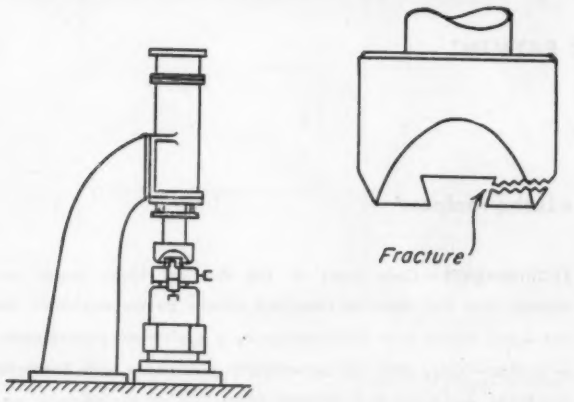
Also, the part is self-removing when the tool is retracted. The drill, after breaking through, enters the hardened bushing in the plate jig, and acts as a pilot during the "trepanning" action of the sawblade. *G R Milner, Lincolnshire, England*



Another Easily Adjustable Boring Bar

A simple and effective method to provide a limited fine adjustment to boring bars is shown here. In use, the tool is set to make a trial bore, and any error in size is compensated for by turning the jackscrew which forces the tool outwards. HSS tools can be used in this holder, but carbide bits are preferred because their use will avoid the necessity of too frequent adjustment. *G R Milner, Lincolnshire, England*





Repair For Hammer Head

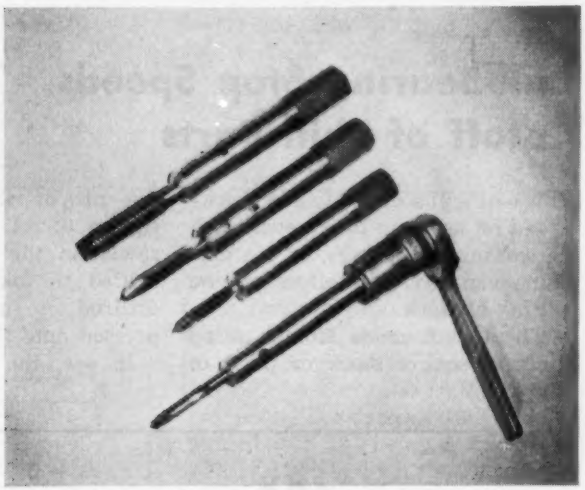
On our 1-ton air hammer, the dovetail part of the ram head broke, and had to be repaired, to hold the hammer tight. As the taper fit between the piston rod and ram was too tight, it was impossible to disassemble the parts and make repairs in the usual manner, so we found another way to do the job.

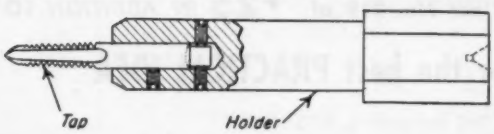
We managed to seat an 18-in. horizontal shaper under the ram head and machined the dovetail shape right out of the head with the ram still on the hammer.

In the setup, the piston rod and broken ram were secured tightly, and the shaper was levelled and fixed in place. Then a lathe toolholder slide was mounted on the swivel-head of the shaper.

During machining, the crossfeed was controlled by the handle of the swivel-head, and the depth of cut was established by the handle of the toolslide. A carbide-tipped tool was used to cut the hard surface of the ram head.

Although the total weight of the falling parts was reduced somewhat with this method, the loss in mass did not have any appreciable effect on hammer capacity. *C Y Lee, Tai-Chung, Formosa*



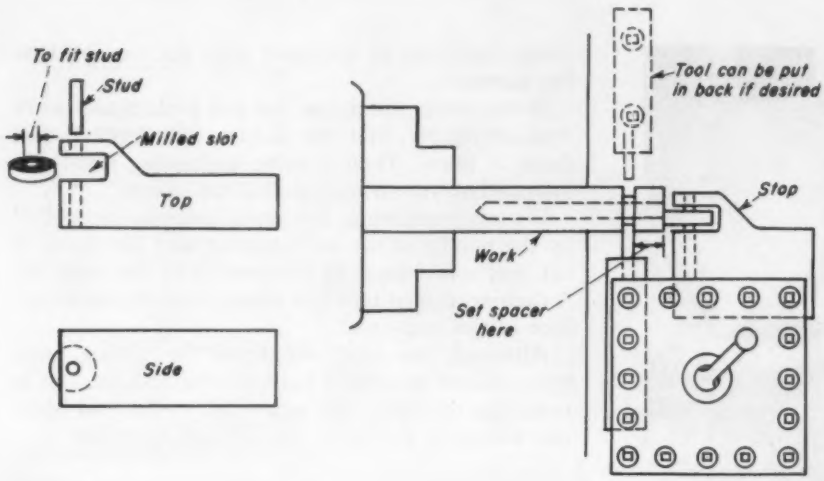


True-Running Tapholder Aids Aircraft Jig Construction

This permanent set of holders—one for each widely used tap—permits tapped holes to be made accurately, with less bellmouth.

To make the tool, hex rod of the proper size is selected to fit standard socket wrenches. The body of the rod is turned and endbored to fit the tap shank. Two opposing setscrews hold the tap on its squared end, while a third screw holds the shank of the tap. The holders are also centerdrilled for use on a lathe.

Holders of this type are especially useful for tapping in restricted places, such as in constructing floor jigs in the aircraft industry, where fixtures must be mounted, and space to work is generally at a premium. *Robert J Lemp, Sayville, NY*



Ball-Bearing Stop Speeds Cutoff of Thin Parts

This tool will accurately and quickly cut off as many thin pieces, such as washers or spacers, as the machine capacity will allow at one setting of stock.

The tool is made from a scrap piece of square stock or plate of the proper thickness to fit the square turret. A slot is milled or sawed in the tool, and a hole is drilled to take a short piece of drillrod. A small ball bearing is pressed onto the drillrod.

In use, the parting tool is set in one side of the square turret, in the front of which the ball-bearing stop is placed. Distance between the edge of the ball bearing and edge of the tool is set by a spacer of the desired thickness of cutoff stock. The roller is set against the end of the stock, the cross-slide is locked, and the tool is advanced to cut off the work. Because the outer race of the bearing turns with the work, it is not even necessary to stop the machine between cuts for most work. The tool works equally well in front or back slide of the machine. *Phil McCafferty, Stanwood, Iowa*

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for the best PRACTICAL IDEA

IN THE JANUARY 3, 1955 ISSUE

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An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

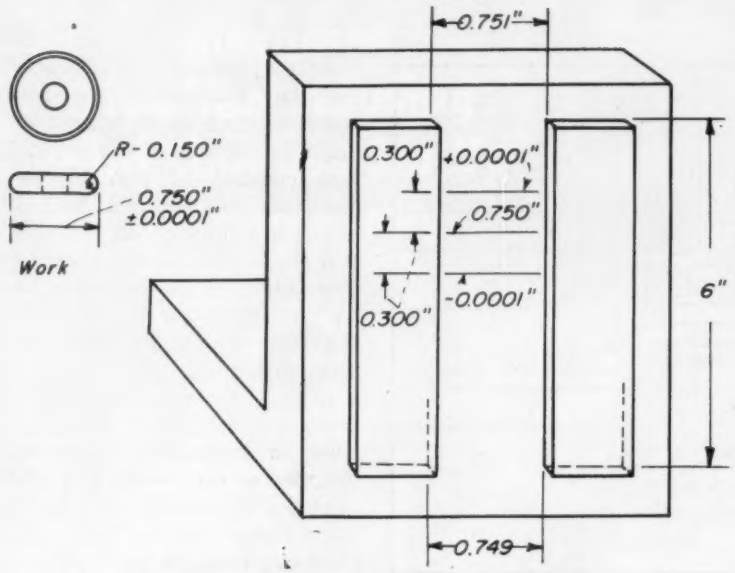
PAYMENT — $25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received — usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author — every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

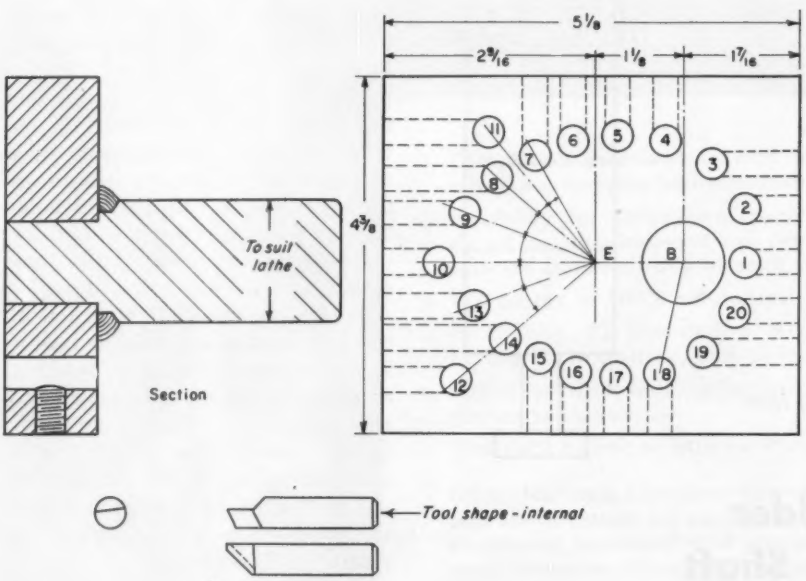
HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y



Tapered Parallels Gage Rollers

We had to check a number of rollers which had a 0.150 spherical radius on the outer surface. The dimension we had to check was 0.750 ± 0.0001 in. We had trouble checking the work with either micrometers or comparator, so we used the simple method shown here.

Two 6-in. parallels were bolted to a small angle plate, with the top of the parallels 0.751 in. apart, and the bottom gap 0.749 in. A standard 0.750-in. roller was allowed to ride down the gap between the parallel until it came to rest, and a line was marked just touching the top of the roller. Other lines 0.300 in. above and below this line gave us the tolerance of 0.0001 in., and we had a quick visual check on our parts as we slid them into the gap. *W I Morgan, Somerset, England*



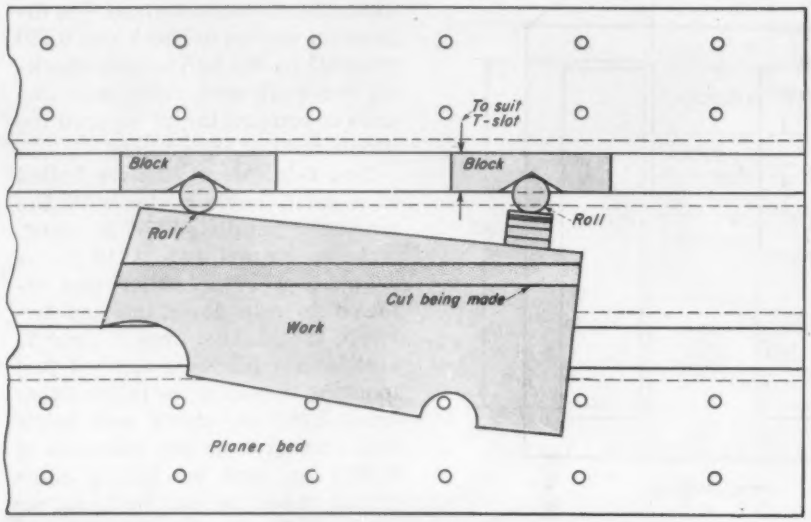
Deburring Tool Has Wide Range

Whenever it is possible, it is good practice to remove burrs and sharp corners from work before removing it from a lathe which has just finished machining the part. The toolholder shown here helps to do this work quite simply.

The flat body of the tool is bored to take the shank which is pressed into place and welded. Starting on a center line across the tool body, and at the center of the shank, a hole is marked out 1⅛ in. from the center, to construct the hole pattern. Working from this point, the face of the tool is divided into 20° being established with relation to both the true center of the shank and the construction center of the tool. Other dimensions are as shown.

This hole pattern will include all diameters from 1½ to 6¼ in. in ¼-in. increments. Because the tools are ⅜-in. round, it will be seen that any diameter 6¼ in. or less can be chamfered internally or externally, as it is possible to use either left- or right-hand tools.

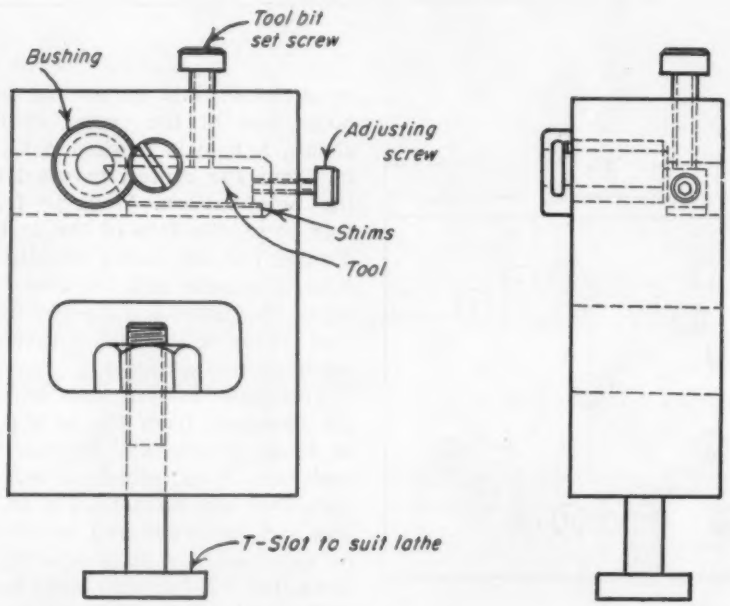
The tool has been in use in our plant for some time, with very good results. One precaution is not to leave setscrews in the toolholder when the particular hole is not in use, as the screws tend to work loose and fall out, causing risk of damage. It is a good idea to use only one screw and move this around as needed. Toolbits, of course, can be either HSS on carbide. Over-all dimensions can be varied to suit. *D More, Victoria, Australia*



Sine-Bar Attachment Sets Planer

This is a practical and inexpensive sine-bar attachment for setting work which is to be planed at an angle to one side of the work. The tool consists of two blocks of hardened and ground tool steel which are finished on one side to suit the T-slots of the planer bed. The other side of the blocks has a "V" milled in the center to locate the rolls which are used during measurement.

In use, the operator slides the block into the T-slot, then puts the rolls in place. Center-to-center distance of the blocks is a matter of choice for the operator. It is then a simple matter to insert proper gage blocks to set the work at the required angle. *Nichols DeCarlo, Wethersfield, Conn*



Bushing and Toolholder Aid Threading Long Shaft

We had to thread a very long, slender shaft that was to be used with a long nut, so the lead of the shaft had to be accurately controlled. With a standard diehead we could not do the job well, as the lead was continually produced undersize.

The tool shown here enabled us to do the job quickly and well, by permitting us to chase the thread with one pass of a single-point tool.

The tool is essentially a replaceable guide bushing held in a special toolholder. The bushing can be changed to allow for wear or to accommodate work of different diameters.

A block of CRS is fitted with a T-bolt at its base, to hold the block on the lathe compound rest. The block is clamped in place with the face indicated square, and, by putting drills and a reamer in the lathe headstock, a hole is bored through the block. This hole will later hold the bushing.

Then the block is removed from the lathe, and a slot about ½ in. wide is milled on the opposite side, with one edge of the slot just above the centerline of the reamed hole. Tapped holes are then provided for the bushing lockscrew, the clamp-screw, and the adjusting screw.

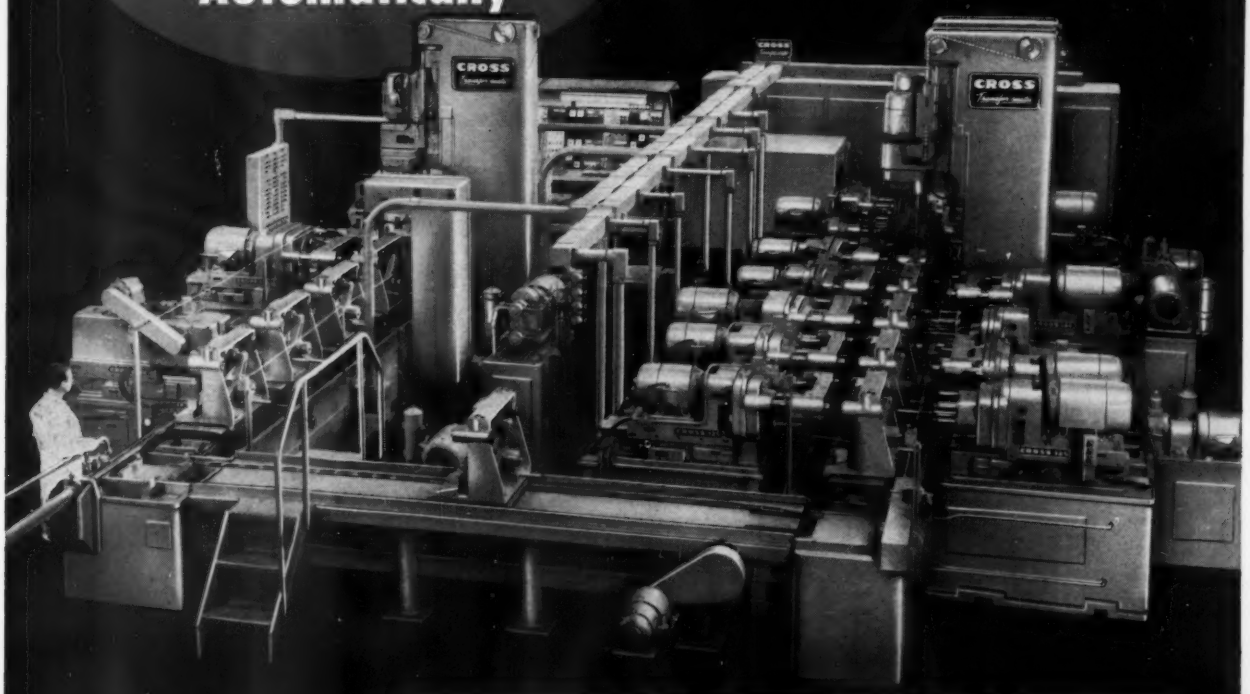
In use, the device is mounted in the lathe compound and the face is again indicated square. A bushing of proper diameter is inserted into the reamed hole. With an indicator in the spindle, the cross-slide is adjusted to bring the bushing to the centerline of the spindle, and the cross-slide gib is locked in place.

A threading tool is placed in the milled slot, and shimmed to bring the point on center.

Stock is chucked, and the feed is engaged. By trial, the toolbit is brought up to cut the work to desired depth. When the lathe reaches the end of the cut, the spindle is reversed to remove the tool from the work. *A Levitt, Bronx, NY*

Another Transfer-matic by Cross

Machines Flywheel Housings and Changes Set Up Automatically



- ★ Completely machines (except for grinding three faces) flywheel housings for both standard and automatic transmissions.
- ★ Flexibility for scheduling because either part may be produced as required—set up changes and proper tools are selected automatically at each station.
- ★ 170 pieces at 100% efficiency.
- ★ 49 drilling, 22 chamfering, 4 reaming, 2 counterboring, 2 boring, 30 inspecting, and 30 tapping operations.
- ★ Palletized work holding fixtures with automatic transfer from station to station.
- ★ Hydraulic power wrench for clamping parts.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; automatic lubrication.

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For the manufacturer who wishes to own his own presses but minimize his initial capital outlay, Verson offers a Customized Installment Program. It is called "Customized" because the payment plan is tailored to the buyer's own financial requirements rather than to a single fixed plan. Initial payments may be as low as 10 per cent of the purchase price with the balance payable over periods ranging from six months to five years. Further information on a plan to meet your needs will be furnished on request. Please outline your requirements.

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For the manufacturer who wants the advantages of modern, efficient presses without capital investment, Verson offers a Customized Leasing Program. Like the Installment Program, a choice of plans is available to best suit the buyer's requirements. In addition to the basic plans, options for continuation, termination and eventual purchase are also available. Special arrangements for special machines will be considered. Further information on a leasing plan to suit your needs will be furnished on request. Please outline your requirements.

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FIRE PRECAUTIONS IN HANDLING TITANIUM...I

Courtesy American Welding & Manufacturing Co, Warren, Ohio

Titanium offers many advantages in strength-to-weight ratio, particularly in the fabrication of aircraft parts, yet poses many technical problems involving manufacture and fabrication, and particularly precaution against fire hazards.

Until recently, American Welding had been taking standard precautionary measures against fire when using titanium. A few months ago, lathe chips and turnings of various sizes, from hair turnings to sizable chips, were stored in a stockpile outside of one of their buildings. Because there was no immediate outlet for scrap, the pile had reached sizable proportions. During a hot, humid afternoon for reasons unknown, this titanium pile burst into flame. These lathe turnings and scraps were saturated in oil, which may have been a contributing factor. Efforts were made to reach the fire by water, soda, and CO_2, all to no avail. Fortunately it was an exterior fire and the only loss was the actual value of the scrap.

In the meantime, American Welding heard reports of other problems and fire hazards involving titanium. A midwest steel company was descaling titanium sheets by one of the acceptable methods. The hot stack of sheets was lifted from the bath and ignited spontaneously. The bath, which usually operates at about 800 F, was 50 to 100° higher than prescribed temperatures. The excess heat and the exposed surface of the titanium sheets permitted a chemical reaction to set in, immediately causing fire. This also happened in a sodium-hydride bath when the temperatures were above the prescribed maximum.

American Welding made a comprehensive survey of manufacturers of titanium, fabricators, and the Bureau of Mines, to assemble as much information about titanium and its hazards as possible. The survey was made under the direction of Thomas Brown, director of safety for Amweld.

This is a summary of the information gathered through this survey:

DEGREE OF FLAMMABILITY

As a fine powder, titanium (somewhat like coal dust, flour dust and even house dust) is explosive and may ignite spontaneously if dispersed in air. Small particles, such as are obtained in sawing operations, ignite easily and burn with brilliant incandescence. Fine turnings which result from the fine finishing machine cuts can be ignited by a match. At red heat (1300 F), titanium decomposes steam to free hydrogen and above 1475 F, titanium burns readily and vigorously in atmospheres of pure nitrogen.

Coarser turnings and chips (of the order of 1/32 x 3/16 in.) as well as bar stock, forgings and the like, are extremely difficult to ignite and present only slight fire hazard.

EXTINGUISHERS

Ordinary extinguishing agents are ineffective on burning titanium. Water simply accelerates the burning rate and offers the possibility of hydrogen explosions. Water should be applied only to the surrounding structure and to the edges of the fire to cool the unignited material below the ignition point. Foam is without value as it is largely water. Carbon tetrachloride and dry chemical extinguishers seem unsuitable: Carbon dioxide also is unsuitable, because dust clouds of titanium burn readily in atmospheres of pure carbon dioxide.

Some fires can probably be handled by covering with approved dry compound extinguishing powder or absolutely dry sand in the manner of magnesium fires.

Argon or helium gases, to be effective on titanium fires, must displace virtually all the air. They can be used, it seems, only in closed containers, as in the reduction chamber of the Kroll process. They are expected to be effective in fires involving titanium chips or dried sludge only if in closed containers, since the methods for applying these gases for fire extinguishment have not yet been developed.

An atmosphere of argon or helium is normally used over the metal bath and mold. At melting temperatures (about 3250 F) titanium, in contact with air, absorbs oxygen and nitrogen and then becomes brittle and hard to work. The close control needed to produce castings of satisfactory quality of itself thus tends to minimize the fire hazard of the operation.

GENERAL RECOMMENDATIONS

The survey of the hazards connected with handling and working with titanium lead to these basic recommendations:

When machining titanium, the heat conductivity of the metal is such that, if heavy tool cuts are taken, both work and tool become very hot and may ignite oil types of cutting lubricants.

Water or water-base coolants should be used for all machining operations with titanium to provide ample coolant supply and keep the working tool cool. CO_2 can be used as a coolant. This also applies to drilling and tapping, which may cause overheating.

Turnings and metal particles should be removed frequently and

This "editorialized message" was written after learning the results of an extensive survey recently made by another organization.

LAPOINTE the name that is known in BROACHING

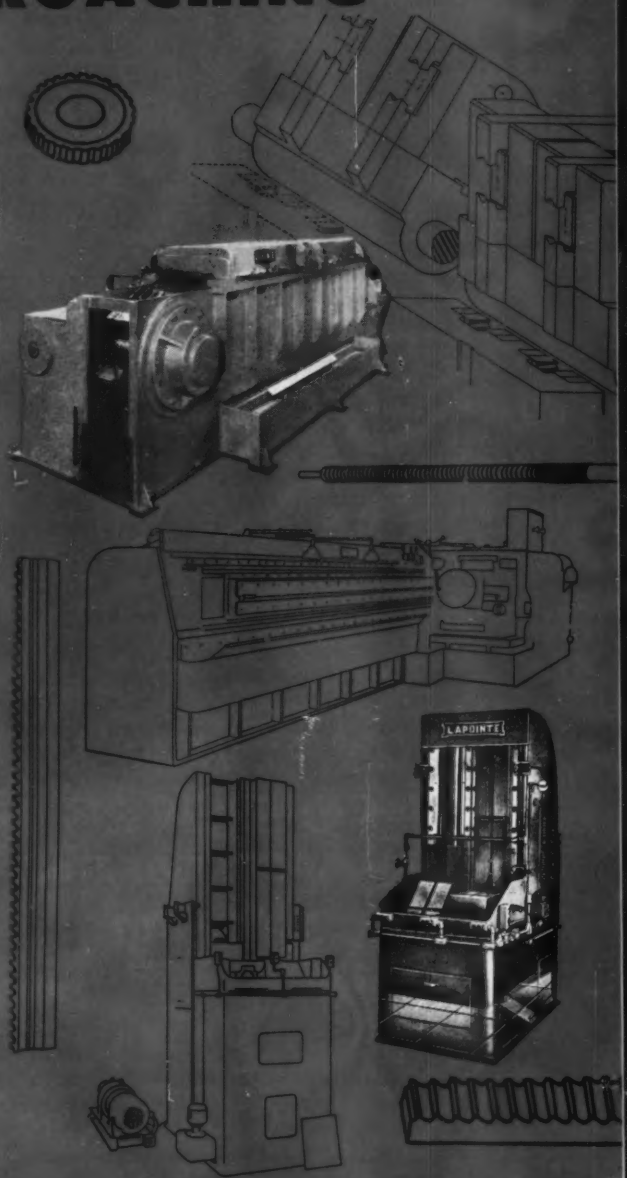
In any industry, there's always one manufacturer's name that stands out — that comes to mind *first* when you think about that industry. You know this is true. You can think of several, right now, without half trying.

In the field of broaching, men for a great many years have put Lapointe at the top of the list in this matter of name recognition. That may be caused partly by Lapointe's age, for Lapointe did indeed pioneer the development of broaching 53 years ago. Or it may be caused partly by Lapointe's size, for Lapointe several times has been forced to substantially increase its plant, this physical growth placing Lapointe always in the "number one" spot as the world's largest manufacturer of broaching machines and broaches.

But age and size alone do not necessarily constitute leadership, or assure that yours will be the name that is known. Here at Lapointe we like to think that it comes from the capable, loyal organization that has been built up through these many years of making broaching equipment exclusively. Our engineers and our plant personnel live in the atmosphere of broaching. And this activity embraces the entire broaching process — including not only the machines and tools but also the designing and building of the all-important fixtures that so often make the difference between success or failure in a particular broaching application.

It is this engineering experience, this ingrained and intuitive "broaching sensitivity", that keeps Lapointe at the top of the list.

We realize that no amount of advertising could accomplish that result. No, it's the quiet recognition and acceptance by important men in industry who *know broaching,* that makes Lapointe "the name that is known." We are grateful for this, and we intend to keep it that way.



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FIRE PRECAUTIONS IN HANDLING TITANIUM...II

placed in covered metal containers. When these containers are about half full, they should be removed promptly to an isolated location.

Cutting tools should be specially designed for titanium and kept sharp to facilitate cutting and minimize heat developed.

Good housekeeping must be observed while working titanium and stocking processes should be kept at an absolute working minimum.

SAWING AND GRINDING

When sawing or grinding titanium, dust and particles are produced that are subject to ready ignition, causing a serious fire and explosion hazard.

In dry grinding, the particles seem to oxidize and become inert. Dry grinding should be done with constant breaks in the work to allow heat in the material to disperse.

Grinders for a titanium operation should be equipped with a water exhaust. Such a water system should not be used for other metals.

In wet grinding, only water or water-base coolants should be used. Titanium sludge from wet grinding or machining operations should not be permitted to dry out before it is removed to an isolated outdoor location.

FORGING AND HEATING

Forging, rolling, and heat treating operations present only a moderate fire hazard. However, care must be taken to avoid contact with iron oxide at high temperatures. Normally, titanium is heated in air to 1500 to 1700 F range for forging. Annealing is done at 1200 to 1300 F and stress relieving at about 600 F. Heating must be carefully controlled to avoid embrittlement and subsequent difficulty in machining or forming. During these periods of high temperature, extreme care must be taken to avoid any contact with iron oxide.

Conventional degreasing methods can be used for titanium. Scale is usually removed by sodium-hydride descaling in a caustic bath or by sandblasting and followed by a bright dip in 2% hydrofluoric 10% nitric acid solution.

One incident of fire or explosion was noted in correspondence received during this survey. This covered an explosion in College Park, Dec 29, 1953, when 24 flasks containing a total of 118 titanium specimens and 6 liters of red fuming nitric acid exploded in the face of a chemist. This was in a report from the US Bureau of Mines.

HANDLING POWDER

The handling of titanium powder is one of the most hazardous phases of working with the new metal. Finely dividied titanium powder should always be stored in a cool, ventilated area way from areas of acute fire hazard, open flame, and powerful oxidizing agents. When used industrially, care must be taken to provide good ventilation so that the concentration of dust in the air does not build up to possible explosive proportions. MAC value—that is, parts per million in one cubic foot of air from an 8-hour work day, for hydrogen chloride is 5. According to the Ordnance Corps, US Army, it is assumed that the same would apply for titanium. Certainly not above 50 MAC.

When shipping titanium metal powders, wet with not less than 20% water, must be packed in containers thus: In wooden boxes with inside metal cans of not less than 22 gage, nor larger than 10-gal capacity. These should be tightly and securely closed. Not more than one such inside container may be packed in an outside container. This is covered by ICC Packaging Specifications 15A and 15B.

HANDLING COMPOUNDS

Many of the titanium compounds must be handled with care. Titanium dichloride is very flammable and burns like tinder in air and is decomposed by water. Therefore, it must be kept away from air and moisture. When it is exposed to air, it evolves hydrogen chloride fumes which are extremely toxic.

Titanium chloride should be stored out of contact with air, preferably under an inert gas. It should be kept away from water and all sources of moisture. Personnel who work with it should wear protective equipment the same as is recommended for exposure to hydrogen chloride. Container should be kept closed and plainly labeled. Personnel who have been exposed to titanium dichloride will show signs of intoxication. Standard treatment and first aid principles for exposure to hydrogen chloride should be applied.

Titanium tetrachloride is a very corrosive liquid. When in a water solution, the excess hydrogen chloride formed by hydrolysis creates a very strong acid. Like titanium dioxide, when it comes in contact with moisture in the air, it hydrolyzes to evolve hydrogen-chloride fumes, which are very dangerous.

Titanium tetrachloride should be stored in a cool place, well ventilated, and away from areas of acute fire hazard. Containers should be closed and plainly labeled.

Personnel working with this material should take the same precautions as those working with hydrogen chloride, according to information from the US Bureau of Mines.

Titanium trichloride is a highly corrosive liquid which can cause burns of the skin and mucous membranes. Its other characteristics are the same as those of titanium tetrachloride.

When the Chips are down

4140 LEADED

These chips taken from a single point turning on a turret lathe are visible proof of the better chip formation and superior machining qualities of leaded Aristoloy.

4140 UNLEADED

Under the same conditions single point turning of unleaded 4140 on a turret lathe produced these long continuous chips.

● It's a good bet you can cut machining costs by specifying leaded Aristoloy or Ledloy* in your plant. The addition of lead to steel acts as a lubricant and substantially reduces friction between chip and tool. This permits higher machining speeds and faster feeds. Tools last longer and the finished part has a finer, smoother finish. The results of our own testing and the experience of dozens of enthusiastic users also indicate that the lead addition which works this dramatic miracle in no way affects basic steel characteristics. Heat treating, tensile strength ductility, and impact strength are unchanged. Neither does the lead present a health hazard for normal forging or machining operations.

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TOLERANCES FOR DIE CASTINGS

Courtesy American Die Casting Institute, Inc

These first product standards for die castings were issued March 1. They were prepared by the American Die Casting Institute, representing job shop die casters. The values shown represent normal production practice at the most economic level. Greater accuracy involving extra close work or care in production should be specified only when necessary as "overspecification" may involve additional cost.

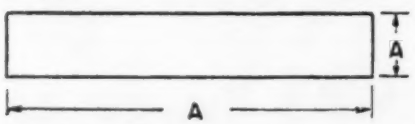
ADCI-E5-55T, Flatness Tolerances, as cast, in.

Flatness is measured with a feeler gage from three widely separated points on a continuous plane surface of the die casting.

DIMENSION*	ALL ALLOYS
Up to 3 in.	0.008
For each additional inch	0.003

**Dimension means maximum dimension (diameter of a circular surface or diagonal of a rectangular surface).*

ADCI-E1-55T, Linear Dimension Tolerances, as cast



The tolerance on a dimension *A* will be the value shown in the table. This tolerance must be increased where the parting line of the die, or moving die parts affect dimension *A*—see Standards E2 and E3.

Critical dimensions, tolerances, in.

Length, *A*	DIE CASTING ALLOY			
	Zinc	Aluminum	Magnesium	Copper
Up to 1 in.	±0.003	±0.004	±0.004	±0.007
1 to 12 in.	±0.001	±0.0015	±0.0015	±0.002
for each additional inch Over 12 in.	±0.001	±0.001	±0.001	—

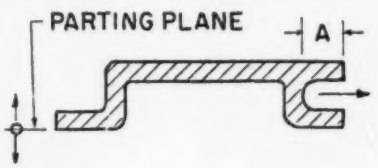
EXAMPLE: An aluminum die casting would have on a 4.000" Dimension A a tolerance of ±0.0085 in. if that dimension is not affected by a parting line or moving die part.

Non-critical dimensions, tolerances, in.

Length, *A*	DIE CASTING ALLOY			
	Zinc	Aluminum	Magnesium	Copper
Up to 1 in.	±0.010	±0.010	±0.010	±0.014
1 to 12 in.	±0.0015	±0.002	±0.002	±0.003
for each additional inch Over 12 in.	±0.001	±0.001	±0.001	—

NOTE: The tolerances shown above must be modified if a parting line or moving die part affects Dimension A.

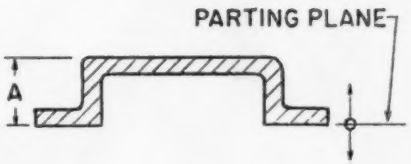
ADCI-E2-55T, Parting Line Tolerances, in.



Parting line tolerances, in addition to linear dimension tolerances, must be provided when the parting line affects a dimension. They are based on a single cavity die. Projected area is the area of the die casting in square inches at the parting plane.

Projected Area, sq. in.	DIE CASTING ALLOY			
	Zinc	Aluminum	Magnesium	Copper
Up to 50	±0.004	±0.005	±0.005	±0.005
50 to 100	±0.006	±0.008	±0.008	—
100 to 200	±0.008	±0.012	±0.012	—
200 to 300	±0.012	±0.015	±0.015	—

ADCI-E3-55T, Moving Die Part Tolerances



Moving die part tolerance must be added to linear dimension tolerances when a moving die part affects a dimension. Projected area is the area, in square inches, of the portion of the die casting affected by the moving die part.

Projected Area, sq. in.	DIE CASTING ALLOY			
	Zinc	Aluminum	Magnesium	Copper
Up to 10	±0.004	±0.005	±0.005	±0.010
10 to 20	±0.006	±0.008	±0.008	—
20 to 50	±0.008	±0.012	±0.012	—
50 to 100	±0.012	±0.015	±0.015	—

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Widespread acceptance of the New V-R Toolholder has made possible manufacturing economies in the production of these New Toolholders. These production savings are now being passed on to the user, resulting in price reductions of $7.50 to $10.00 (depending on size) for Toolholders using New "Throw-Away" inserts and reductions of $7.50 on Toolholders for 1½" long inserts. These New lower prices of V-R Toolholders plus the economies of "Throw-Away" inserts makes possible outstanding savings in carbide machining.

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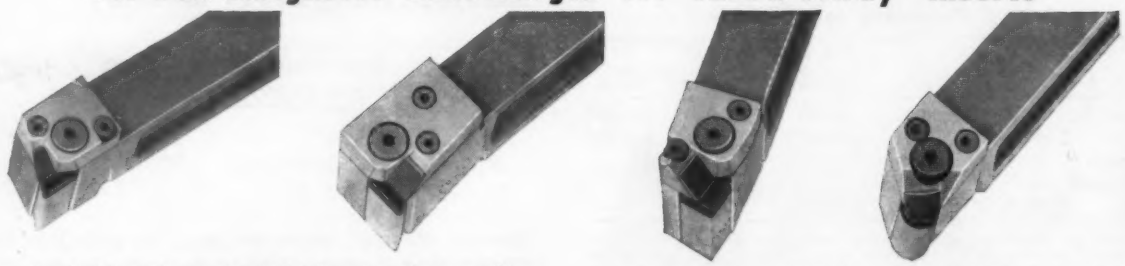

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Field Report USA:

Talking Shop . . .

Trouble Off 20

THE IRON AND STEEL INDUSTRY cut its lost-time accident frequency 19%, severity 20%, during 1954. Rate was 3.85 lost-time accidents per million manhours worked, against 4.75 in '53. Severity rate was reduced from 1.08 in '53 to 0.87 day per million in '54.

Standards Go Up

US STANDARDS have now increased to 1440. Some 64 new ones were added last year, and 88 old ones revised. In the mechanical field, new ones included B6.12 on nomenclature for gear-tooth wear and failure, B29.3, B29.4, B29.5, B29.6 and B29.7 on transmission chain and sprockets, and several on oil and grease cans. Of particular interest is a new standard method of recording and measuring injuries received at work. BLS and National Safety Council both have adopted it, urge industry to do the same.

Convair Suggests

CONVAIR-FORT WORTH reports its suggestion system paid off to the tune of $2,674,874 last year. Of this, all but $146,475 was saved by cost-improvement suggestions from members of supervision, for which no awards are made. The highest employe award was $1,119 last year, and one employe made six acceptable suggestions, all award winners.

Go Home, Young Man!

HIGH-SCHOOL STUDENTS of the area around Youngstown, Sharon, Niles, and Warren recently attended a 2-week industrial show in Youngstown in which 74 companies cooperated. Idea: to sell the kids on taking jobs near home, and in industry.

Hafnium Carbide

HARDER than boron carbide, hardest man-made material until several sources announced real diamonds recently (the latest "discoverer" is a Scotsman working in Holland), is Hafnium carbide, recently produced at Oak Ridge. It has V_{50} values of 2900, compared with 2400 for boron carbide and 8400 for diamond. It can be hot-pressed into desired shapes in graphite dies at pressures around 1500 psi and temperatures around 2000 C.

Faster Security Clearance

DEFENSE DEPT has revamped its security-clearance program for workers in defense plants. Object is to speed up worker clearances and make system uniform. In past 18 months, 4000 industrial workers have been suspended for security reasons, and about one-third of the cases resulted in hearings. Under the new plan, all cases will come first to the Pentagon to determine whether a suspension is justified. After that the suspended workers will get a local hearing.

Fair Discounts

THE GERMAN INDUSTRIES FAIR, to be held in Hanover, April 24 to May 3, is really going out of its way to make things easy for foreign visitors. Among other services, it offers free passport visas to holders of admission tickets purchased abroad, free guide and interpreter service in almost any language, and a 25% reduction on German railroads for trips to and from the fair, as well as for tours in Germany. Similar reductions have also been arranged on most other European railroads. And a fair ticket costs only $2.40.

How Big is a Billion?

IN THESE DAYS of fantastic figures, we talk glibly of billions, but few people realize how big a billion is. To take a concrete example, suppose you went into business in the year AD 1 with a billion dollars, and lost money at the rate of $1000 a day. You would still be in business, and have enough left to carry on for another 800 years! In plain English, it's hard to get rid of a billion dollars if you spend at a reasonable rate. It's only when you entertain the world that it goes fast.

Chinaware

OUR STORY on ceramic tools at Watertown Arsenal (*AM* — Feb 28, p153) was shared by newspapers. The AP dispatch really dramatized it, calling it a "chinaware tool" and saying it cut steel "like cheese." Says the dispatch: "The heart of the new tool . . . looks like a piece of chinaware or a bit of tile from your bathroom floor. Yet this ceramic material sliced hard steel like an apple-paring from a cylinder whirling on a big lathe at a rate three times as fast as hard, metallic carbide cutters."

More Powder

DESPITE the general-business decline, iron-powder made in the US rose from 12,509,630 lb in '53 to 14,667,059 lb in '54—about 25%. In addition, imports (largely from Sweden) totaled 19,669,660 lb in '54, compared with 13,928,506 lb in '53. Copper-powder shipments, however, dropped from 23,030,850 lb in '53 to 19,339,559 lb.

Glass Top

FRIDEN MACHINE has just put a glass-fiber top on its computing machines, replacing aluminum, to cut a 32-hr job to four. A master wood-and-metal pattern is put in a box to make a plaster of paris mold. This in turn is used to make a duplicate of the pattern in semi-rigid synthetic rubber. The mold thus produced is lubricated by brushing with household wax. Glass fiber, impregnated with a resin solution, is placed inside. An airtight hood covers the male ram and seals to the female, and is exhausted by a vacuum pump (to remove bubbles) while the mold halves are pressed together by (of all things!) the spindle on an old drillpress. After a 20-min cure, the part is trimmed, drilled and finished.

Field Report USA:

Metalworking's Running Well Ahead

A note of optimism . . .

Coast to coast and in almost every segment of Metalworking, a spirit of optimism prevails. Companies who did well in 1954 expect to do even better in 1955. Companies who suffered a slump in 1954, with a few notable exceptions, expect to come out of it this year. Here are some representative samplings of opinion and current business conditions in major, bellwether firms in many segments of U S Metalworking:

Reports are Favorable

International Harvester is fast coming out of the 1954 slump in agricultural machinery and implements. Today, sales are running 5% ahead of a year ago, in spite of a $30-million drop in defense business. Tractor sales are up 64% . . . Eaton Mfg Co, Cleveland automotive supplier, is operating many of its divisions on week-end shifts to meet heavy Detroit demand . . . Pullman Standard reports increasing demand for special-purpose freight cars. Its subsidiary, Trailmobile Inc, has the biggest backlog in its history . . . General Bronze Corp, New York, bettered its sales 15% in 1954 over 1953, expects to do even better in 1955, starting with a $16.8 million backlog as of January 1.

Yale & Towne Mfg Co predicts "substantially increased hardware sales in 1955," and says volume of new orders for materials handling equipment indicates 1955 will be much better than 1954 . . . American Radiator & Standard Sanitary Corp reports 1954 was a good year for plumbing fixtures, finds outlook for its products here and abroad to be extremely favorable for 1955, and plans $60-million for capital expenditures in the next two years . . . Lockheed Aircraft Corp, Burbank, Calif, chalked up highest earnings in its history in 1954, despite an 11% cutback in sales, is currently negotiating $158 million in new orders . . . Republic Aviation reports a current $1 billion backlog, has contracts for several new military planes . . . Fruehauf Trailer Co, Detroit, says orders for commercial trailers are at record levels, plans to expand output of a new aluminum trailer five times . . . Mesta Machine Co, Pittsburgh, has upped its last year's backlog from $30 million to $50 million.

Output highest since October '53

Overall, industrial output is at its highest levels since October 1953. While some industries, such as screw machine products and shipbuilding, are in a definite slump—and some, such as tool and die making are "spotty," varying widely from shop to shop and area to area, most segments of Metalworking are doing much better than last year—and they're looking forward to even better business this year and next.

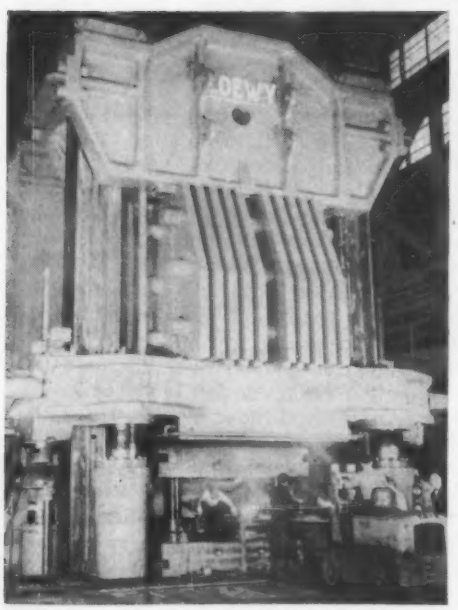
East Coast...

Tool and die business spotty . . .

Five weeks' backlog is about the best reported by contract tool and die shops in this area, with some of the smaller shops living from hand to mouth. The consensus of shop owners is that there just isn't enough work to go around, and that what work there is is going to the shops with top reputations, with the rest scrambling for the crumbs. Plenty of inquiries are reported, but little follow-through — indicating customers are shopping around for bargains.

One area jobbing shop reports it has a five weeks' backlog, but is having a lot of trouble holding it.

NORTH GRAFTON, MASS: First Forging Press



ONE MAN CONTROLS the gigantic press from this electric control table, which governs press speed as well as other operations. Six men stationed along the line report trouble instantly

LARGEST PRESS OF ITS KIND IN USE, the press exerts a 35,000-ton pressure, was started in June 1954, completed on February 7 1955

Field Report USA:

# of Last Year—With a Few Exceptions

In spite of this, the shop is maintaining a 47½-hour week. Nine months ago, this firm had a nine months' backlog, but the cutback in defense dropped it to the current five-week level, and today's business is 95% civilian.

Another shop says business is picking up. Less than two months ago, this firm had a three weeks' backlog, today it's five weeks.

One tool and die manufacturer is said to have cut his work force from 25 men to 4 in recent months, and this is by no means exceptional among the smaller shops.

What little overtime work there is in this area isn't because of excess business—it's attributable to a prevailing customers' attitude of "got to have it in a hurry."

Fastener outlook isn't good . . .

Middle Atlantic industrial fastener and screw machine products manufacturers feel they're badly let down by the government. One U S maker of precision parts for watches and instruments is boiling mad at the government for (1) letting several lucrative precision parts contracts go to European firms for offshore procurement work, and (2) raising the tariff on imported watches "to no apparent purpose," while failing to do so on imported watch parts.

A spokesman for one firm claims the New York-New Jersey area industrial fastener and screw machine products price cutting has reached a stage where some manufacturers are selling their output for the scrap value. This firm has been forced to cut employment 50% since March of last year. Another maker of industrial fasteners claims it's only standard nuts and bolts that are really feeling the pinch; that special jobs such as self-locking nuts are in high demand.

Odds and ends . . .

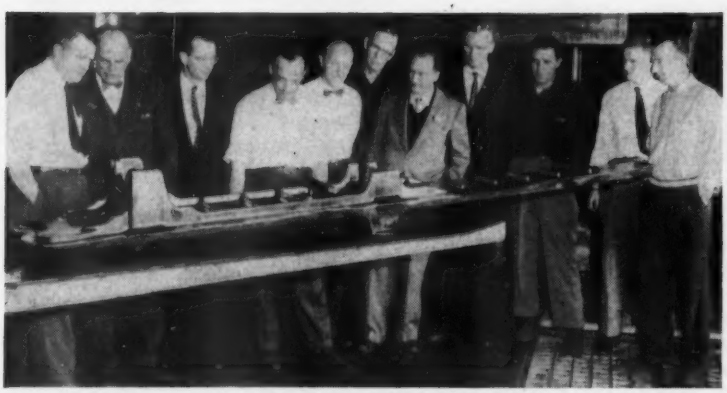
Firth-Loach Metals Inc, Philadelphia, turned out its first carbide blanks in January. F-L is a new firm formed by the ex-president and ex-chief engineer of Philadelphia's Firth-Sterling Inc.

Two Eastern manufacturers of jig borers and jig grinders report backlogs up to two years, good current demand . . . One large Eastern stamping firm reports its backlog as of mid-February was 1-2 months, as of mid-March it was upped to 2-3 months —attributes the jump to aggressive selling and technological improvements in its plant . . . Curtiss-Wright Corp, Wood-Ridge, N J, says that its cost cutting program, in line with "more Air Force per dollar" thinking, has effected savings of more than $28 million in its Engine Division alone to date . . . Pratt & Whitney Aircraft, East Hartford, Conn, has just shipped its 1000th J-57 jet turbine . . . Westinghouse Electric Corp notes a marked increase in new orders for electric power equipment during the first two months of 1955.

Schick, Inc, largest U S electric shaver maker, has settled with International Association of Machinists on the question of severance pay. Schick's complete benefit package will cost in the neighborhood of $500,000 a year. The firm plans to halt production at its Stamford, Conn, plant by April 1, will move to a new plant in Lancaster, Pa. . . . GM's Research Labs Division at Pittsburgh plans to supply industry with both laboratory and production quality control standards that will give user industries a basic yardstick with which they can compare the composition of any melt.

Firth-Sterling Inc, Pittsburgh, has acquired Houston Carbide Corp of Houston, Texas. Will operate it as a division . . . Baldwin-Lima-Hamilton Corp in a further diversification

Goes into Production Under AF Heavy Press Program



LARGEST LIGHT ALLOY DIE FORGING ever made in the U S, a 12-ft wing spar for a Convair Air Force interceptor, is inspected by plant officials. Spars required three sets of dies, largest ever made for a forging press, with a total weight of 16,800 lb. Spars, Wyman-Gordon says, were turned out "in astonishingly little time" at a great savings in costs and man hours

SLATED FOR CIVILIAN AS WELL AS AF USE

NORTH GRAFTON, MASS — First giant closed-die forging press in the Air Force Heavy Press Program is now in production at Wyman-Gordon Co's plant here. First run was of the largest light alloy forgings ever produced. The 35,000-ton press, designed by Loewy Construction Co, can be used on civilian work, as well as combat aircraft. Next in order of production are structural parts for the F105, F100, the KC135, Boeing's jet tanker and other military aircraft. Press is hydraulically activated, has a dead weight of 7180 tons, has accessories weighing as much as the press itself. It's the most rigid press ever built, will produce forgings to such close tolerances that a minimum of machining time is required for each forging.

move (another recent acquisition is Loewy Construction Corp) has purchased Ruge-de Forest Inc, Cambridge, Mass, electronic instrument firm . . . International Silver Co of Meriden, Conn, has acquired control of Times Wire & Cable Co, New York, makers of coaxial cables for television, and will move it to Meriden . . . United Aircraft's Pratt & Whitney Division, Hartford, Conn, has been awarded a $12-million Navy contract to produce J-57 jet engines . . . Avco Mfg Corp's Lycoming Division has two new Navy contracts totaling $4.7 million to produce R-1820 aircraft engines and special tools . . . Kollsman Instrument Corp, Elmhurst, L I, N Y, also has a new Navy contract—$2 million for airspeed indicators.

Cleveland...

Stamping upsurge . . .

CLEVELAND—The stamping industry's current recovery from the dead and not-so-dear days of 1954 closely parallels that of the steel industry, according to the Pressed Metal Institute. Most Cleveland area plants are operating on a five-day week single-shift basis. While the automotive industry is the bread-and-butter mainstay of local stampers, they're getting some jam on their bread, too, these days in the form of an order harvest from the home appliance and office machine industries, and to a lesser extent from the farm implement industries.

Stamping backlog, however, is extremely spotty, with the well-equipped shops in a more comfortable position orderwise than they have been at any time in the last year. Some shops are working against a too-small steel inventory and are having trouble building up to a balance. But there's nothing even resembling a gray market in steel in the Cleveland area.

Inventory turnabout . . .

Steelmakers in the Cleveland-Lorain and Youngstown-Mahoning areas are being pursued now by customers who carried inventory reductions to an extreme last year. Caught suddenly by the surprisingly quick pickup in steel orders in December, many users are operating under conditions similar to those following WWII insofar as raw material supplies are concerned. Steel orders have reached their highest point in the last year-and-a-half.

Auto firms are estimated to be taking about 25% of steel sheet and strip output, contrasted with about 20% in 1954. All steel items are in heavy demand—and there's a surprising growth in demand for export steel. Galvanized sheet, bar stock, plate, oil country items and wire products are in especially strong demand.

Current operating rate in the two Ohio steelmaking districts is 92% of capacity—and this is expected to stay up at least through the second quarter. Because of the widening base from which orders are flowing into the steelmakers, they aren't nearly as scared of a possible auto strike next June as they once were.

Tool and die business improves . . .

January tool and die new orders reached their highest volume in January since May 1954—12% more than in December, but 6% below the January 1954 level. January shipments, however, dropped 24% below December volume—but December was 'way above the average level for 1954.

Tool and die industry backlog was up 5% at January's end, mainly because of cutback in overtime in a number of shops. This marked the first time that the tool and die backlog has shown any upward tendencies since February 1954.

In a recent poll, 7% of tool and die manufacturers reported the business outlook as "excellent," 36% as "good," 47% as "fair," and 10% as "poor."

This is especially encouraging: early February reports from widely scattered shops indicate new order volume will show the tool and die industry is again on a full diet.

Southeast...

Tool sales look good . . .

Machine-tool picture throughout the Southeast looks promising for the first half of the year, maybe even longer. Tool salesmen and regional representatives in Atlanta report inquiries and sales are well up over this time last year, though still some 30% behind the Korean peak. Prices are generally trending upwards, about 5%, with deliveries at a much faster rate. Biggest sellers in the Southern states right now are general-purpose, machine-shop tools. Production line tooling is currently slow but with Lockheed Aircraft at Marietta, Ga, facing a possible new jet tanker production schedule, tooling may get a boost in the near future.

The South and the minimum wage . . .

Talk of raising the Minimum Wage Law has Southern business worried. One employer association group, in referring to the AFL-CIO proposals for a minimum wage of $1.25, called such actions part of "organized labor's continuing efforts to wipe out the South's natural advantages." Actually, most Southern businessmen are willing to go along with slight increases—say to 90¢ or $1 an hour. Such rates would not be too far out of line with present wages in manufacturing industries throughout the South. But the extra 25¢ would be a horse of another color.

Actually, such a boost would not be the big advantage to New England or Eastern manufacturers that some leaders anticipate. One reason is that in companies that are national in nature—say GE, General Motors, DuPont or Ford—the wage differential between Southern and non-Southern workers is narrowing all the time. And most manufacturers quietly agree that wages will be on a par within a very short time.

Detroit...

CIO eyes higher jobless benefits . . .

If the United Auto Workers' campaign for the guaranteed annual wage falls flat, UAW's CIO allies in Michigan are standing by to campaign for increased state unemployment benefits. Maximum weekly benefit is now $42. Aim would be to bring unemployment benefits for married workers up to two-thirds of the worker's average weekly pay, plus $4 for each dependent up to four. Single workers, who are now entitled to $30 a week jobless pay with $4 for each dependent up to four, would draw half their weekly pay, plus $4 for each dependent up to four. Maximum benefit period would be lengthened from the present 26 weeks to 39 weeks, and some barriers to qualifications for jobless pay would be eliminated.

Odd strike settlement . . .

Unique settlement of a 126-day strike at United Platers Inc came about when the AFL Metal Polishers Union agreed to take a 10¢-an-hour pay cut to help the company regain its competitive position—

damaged by the long strike. To put it mildly, any auto plant that might be shut down in the hassle over GAW this summer won't get the same treatment!

Italo-U S sports car combine . . .

Eugene Casaroll, president of Automotive Shippers Inc and Dual-Motors Corp, has joined Carrozzeria Ghia of Italy in a project to build about 150 4-passenger sports cars a year for sale in the U S and abroad. The "Dual-Motors Firebomb" will sell for about $6000 here, will be powered by a 225-hp engine, will be capable of 140 mph. U S-built frames will be shipped to Italy, where Ghia bodies will be welded on. Then assemblies will be returned to Detroit where all other components (mostly Chrysler parts) will be installed. Production should begin in mid-summer.

Chrysler's king-size expansion . . .

For several weeks, Chrysler has doled out news of individual plant expansions ($48 millions for V-8 engines, $35 million for automatic transmissions, $20 million for a 40% increase in Chrysler output) and at long last has admitted it's embarked on a king-size expansion program. Newest announcement is a $10-million expansion of engineering facilities at Highland Park. Space will be increased one-third, employment by one-fifth, and some 800 engineers, technicians and supporting personnel will be added.

Add up expansions to date: Chrysler is spending $115 million.

Thomson Products chassis plant . . .

Thompson Products Inc, major Cleveland auto, electronics, aircraft and auto industry supplier, will build a $6-million chassis plant in Sterling Township, northeast of Detroit. The 390,000-sq-ft plant will be built on a 58-acre site and will replace present research and manufacturing facilities in Detroit. The new plant will employ all of Thompson's present Detroit workforce of 1300, and will ultimately employ twice that number. Thompson's plant will be located near Ford's proposed $25-million chassis plant.

Engineering plant for Vickers . . .

Vickers Inc will build a $2-million engineering and administration building on a 76-acre site near Clawson, Mich. No heavy manufacturing will be performed in the 150,000-sq-ft building, which will give Vickers a chance to consolidate operations now being carried on in some 20 Detroit locations.

Things were tough in '54 . . .

That's certainly no news to a good many Detroit workers who were laid off by Chrysler (Detroit's biggest employer), Hudson, Murray Corp and others. It's been confirmed by Michigan Employment Security figures: unemployment benefits were paid at an average of $7,822,000 per month in 1954—one of the highest averages in Detroit's post war history. Peak came in September, when model changeovers sent benefit payments soaring to $13,234,000, one of the highest levels in history. By December ($4,919,000) however, payments were already dropping.

Southwest...

Things look better . . .

HOUSTON — Metalworking as a whole is improving in this area. It's been on the upgrade since January 1, is better than it was a year ago—but not yet as good as 1953. Local improvement is attributed to an increase in oil allowables. One large machine-tool sales agency says business today is better than at any time in 1954. But it isn't quite good enough yet to make machine shops want to buy lots of new equipment.

Tool and die business varies . . .

Textool Co, Houston, reports that as defense business dwindles it is keeping up production levels by concentrating on orders for design work on specialty goods. There has been a noticeable pickup in this type of work recently. Another shop, Hunter Machine Co, specialists in precision tool and die work, bears out the high-level of specialty business.

Defense cutback is felt . . .

A few area shops are still at work on government contracts. They're fairly busy of course, but on the whole government work is no longer much of a factor here. In fact, one large plant, Dickson Gun, that depended entirely on defense work, has already had many layoffs, will close down shortly. Another plant depending largely on government work has dropped off to a 35-hr workweek. Many smaller shops are also being forced by increasing competition to cut down their production work force.

West Coast...

Uptrend in aircraft . . .

SAN DIEGO—The aircraft industry has been steadily eating into backlogs during the past 12 months, and has dropped employment from about 38,000 to 35,000 in the San Diego area.

But now a reversal of the trend seems to be appearing. Work had dropped off somewhat at General Dynamics Convair Division plant 1 and plant 2 in San Diego with completion of the commercial Convair-Liner 340 commitments. Then in March the U S Government let it be known that an operating base for the F-102A, delta-wing, supersonic jet fighter, will be built at Minot, S D. This was the first official confirmation that the F-102A has been ordered from Convair in operational numbers. Only a month ago the last of the major bugs were worked out of the plane. At the same time the Navy ordered 40 more R3Y Convair turboprop flying boats at a price of $650,000 each.

Rohr Aircraft Corp., Chula Vista, reported new orders amounting to $26.8 million for power packages for the Douglas DC 7-C luxury transport, the Lockheed C-130 turboprop transport and the Boeing B-52 jet bomber. The figure also includes aft sections for the B-52. The figure brings Rohr's backlog to $145 million. Rohr employment has stabilized at 7600.

Rohr also has come through with its stand intact in a six week strike by members of the International Association of Machinists at the Riverside plant. Wages were not an issue. The IAM sought an arbitration clause for settling grievances, something which Rohr has never had in its contracts either at Riverside or Chula Vista. IAM indicated if it didn't get an arbitration provision, it wanted to delete the no-strike-within-the-life of the contract clause. But the members went back to work (March 4) without the arbitration agreement. Rohr has traditionally settled tough grievances by referring them to quarterly sessions between top company officers and the IAM. lodge's executive board.

On the economic front Ryan Aeronautical Co has announced $4 million in new contracts in March for jet-engine components.

Pressed Metal Institute Meets:

Stamping Men Talk Safety, New Techniques, Automation

PMI's Cleveland meeting drew a record crowd to discuss new, safer ways to make stampings — and new sales approaches to meet competition from other fields

CLEVELAND—Applications and advantages of safety devices and educational programs together with new developments in plastic die materials, cold-extrusions and the forming of titanium, held the spotlight at Pressed Metal Institute's Sixth Annual Spring Technical Meeting here March 16-18.

Registration was 50% higher than last year, making it the best attended technical meeting PMI has had. Exhibitors outnumbered last year's list.

Stamping Safety

Opening the three-day meeting, Sam Morrison, president of Morrison Steel Products Inc, and president of PMI, welcomed the members and introduced a panel of stamping experts who presented an all-day session on safety, the theme of which was "Safety Doesn't Cost—It Pays." Moderator was C Glenwood Rose, president of Judson & Rose. Jack Kleinoder, secretary-treasurer of Volkert Metal Stamping, led off the session and emphasized that a safety conscious apprentice is the forerunner of the safe operator.

Ben Small of Morrison Steel Products described various approaches to a safety educational program, but pointed out that specific analyses of safety problems are needed too. Accident-prone workers must be sought out, he said.

Mr Small pointed out that accident costs to a plant amount to more per hour than many strikes do.

Ernest Davis of Kickhaefer Mfg Co, emphasized building as much safety as possible into dies — described the procedure employed in his plant, where discussion on the safety of dies is held with designers and die makers before they are built. Mr Davis pointed out that extensive use is made of cage and sweep guards, slide feeds, hoists for handling heavy bolsters and other safety devices. Further emphasis on the importance of teaching safety was made by C E Meldrum of General Motors Corp, who pointed out that accidents occur even on fully protected automatic setups. At his plant, a complete program of safety meetings is held regularly to get the safety story across on all levels.

L E Dail, president, Dail Steel Products, described a "self-insured" workmen's compensation program organized by three forge plants—one machine shop, two tool and die shops and one stamping plant. Known as a "reciprocal" or "inter-insurance exchange," portions of liability for accidents are distributed over the membership. A competent safety engineer, employed by this organization visits each member plant at least once a week.

Second day of the meeting was devoted to the technique of selling stampings, the technical aspect of estimating, and methods of tooling and production of stamping jobs.

Moderator for the panel on estimating was J J Boehm, president of the Boehm Pressed Steel Co. Speakers were: Thurston K Reid, HPL Mfg Co, and George E Fauth, Bossert Div, Rockwell Spring & Axle Co, who showed a step-by-step procedure for estimating two typical stamping jobs for both high-volume production and short runs.

Mr Reid described the short-run procedure and pointed out that above all an estimator needs good information. This is handled in his plant by standard data set up on the basis of past experience, job records, press capacities, plant equipment and other pertinent factors. By these means, two estimators at HPL accurately handle as many as 1300 jobs per month. Considerations to be taken into account include cost of tools, set-up time required, labor cost-per-piece and cost-of-material-per-piece.

The afternoon session was given over to tooling and production, covering techniques involved in handling a long and a short run job through tooling, scheduling, press selection, material handling, etc.

IT WAS A GALA KNIGHT AT PMI'S MEETING when "Sir Best Presteel" (background) of Worcester Pressed Steel Co presented the first John Woodman Higgins Redesign Award on behalf of company president Carter C Higgins (left) to J B Horvay of General Electric (right) for redesigning a refrigerator drain trough in pressed metal to replace one of plastic. Mr Horvay's co-recipient, D A Solley, also of G-E, was unable to be present for the award

SAE PRODUCTION MEETING: Headliners—Machine Tools and Automation

New machine tool developments, basic principles of automation —and a controversy over how to protect heavy investments highlighted SAE's Production Forum in Cincinnati

CINCINNATI — Representatives of the machine-tool industry were as much in evidence as automotive and aircraft engineers at the SAE Golden Anniversary production meeting and forum held here Mar 14 to 16.

Eight simultaneous panel discussions, arranged by B W Mahoney and Ken Stalker of General Electric, filled the first day. Panel members included about an equal representation of machine-tool builders and material suppliers on the one hand, and of automobile, aircraft, part, and accessory builders on the other.

In the panel on machine tools in automation there was considerable discussion of the Sundstrand self-resetting lathe that had just been announced in *American Machinist* (*AM*—Mar 14, '55, p117).

The lathe is now running two shifts without attention.

F R Swanson, dir of engrg for Sundstrand, pointed out the advantage of machines that are originally equipped for automation, with all the controls and interlocks included, so that the wiring system doesn't have to be torn up when tieing the machine in with an automated line.

It was stated at the meeting that it is not uncommon for new transfer machines to pay for themselves in 12 months, or even in 6 months.

L Terry, chief products engr, Natco, said that one 25-station special Natco machine had 10,000 parts exclusive of standard purchased parts. Such a machine requires 8 to 10 thousand hours of engineering.

This time element emphasizes the need for plenty of time for planning an automated program. If the schedule is crowded too much, if panic planning is resorted to, the line will be in trouble.

W R Slattery, supervisor of mfg engrg, Ford Motor Co, pointed out that average utilization of standard machine tools in auto plants used to be 60 to 75%, and that most transfer machines are bought on 80% utilization.

A photograph was shown of a Sundstrand machine under development that is intended for control by a tape or punched-card program. Each element of the machine is designed to operate independently of all other elements as instructed by the tape. It was not clear whether the machine was one particular type, or a sort of all-purpose prototype.

There was much discussion of automatic assembly, with the feeling generally expressed that this was the area in which the most improvement was likely to come. Natco is planning a special division to develop automatic assembly machines.

Basic Principles

Lively discussion followed the paper presented by E H Kelley and J T Buckmaster, Chevrolet, on the urgent need for six basic principles of automation:

- **Maximum protection** should be provided against the minimum hazard principle—operation sequences should be combined and set up in a matched and balanced manner so the least hazard of machine interferences will result.
- **The module idea** should be extended as far as possible to provide maximum use of standard units.
- The installation should facilitate **straight-line flows** of material with maximum compactness.
- There should be provision for **retention of control** of the product from the earliest point in the process to the nearest final stage.
- There should be provision for **continuity of line operation** in the event of intermediate station failure.
- Provision should be made for production of **current and anticipated future design**, and also ample clearance for other tooling to accommodate interchangeability and past model service requirements.

In the discussion, Emil Gibian, staff director of industrial engineering, Thompson Products, said that he felt three rules should be added:

- Whenever economically justifiable, include **self-adjusting features** on the machine (feedback).
- Concentrate control of a line in **one point if possible.**
- Provide for **quick tool changes.**

Much of the discussion centered around the 6th point. Kelley and Buckmaster argued that with the heavy investment going into production equipment, design engineers must anticipate design changes and predict changes so that production men can make provision for them.

This, they said, would not freeze designs one-half so much as it would if costly equipment were procured which soon proved inflexible and unadaptable to anticipated changes.

In the discussion it came out that on the new Pontiac engine, production and design engineers began working together in just this way two years before *preliminary* tooling release, which in turn was four years prior to the start of production. C B Leach of Pontiac said that the engine is designed to permit changes to larger bore and longer stroke, to permit compression ratios up to 12.5 to 1, and to allow for novel design features such as valve cooling and crankcase ventilation that are not now standard.

In Pontiac thinking, it was said, **the possibility of mechanical assembly was a factor in the engine design.** Design principles included such rules as a straight shot at all holes, all tapped holes would be blind to avoid the need for sealing. After preliminary release a number of design changes had to be made, but even so these rules were permitted.

Others took exception to the desirability of blind taps, but it was generally felt that the average engine today has design features that do not lend themselves to mechanical or automatic assembly.

Paul Miller of Ford said that in the parts and accessory groups **only about 20% of the labor was involved in machining operations** (where most of the recent efficiency gains have come), and most of the opportunity for gain now lies in assembly.

"WESTERN TOOL SHOW": ASTE's

Believed to be one of the biggest industrial shows ever held in the West, ASTE's first show venture West of the Rockies found growing tooling interest on a growing tooling market—particularly in the West Coast's mushrooming aircraft and electronics industries

LOS ANGELES—An estimated 35-40,000 people attended the American Society of Tool Engineers' First Western Industrial Exposition and its concurrent 23rd Annual Meeting at the Shrine Auditorium here March 14-18. While the "Western Tool Show" didn't bring out as heavy an attendance as past ASTE shows in the more concentrated industrial regions of the East, it nevertheless was one of the largest, if not the largest, industrial shows ever held on the West Coast. And exhibitors were agreed that its attendance was made up of technical people who knew what they were after.

Geared to Western Needs

Although there were visitors from as far away as Hong Kong and Saudi Arabia, most of those attending were from the West Coast and the Show's exhibits were aimed at Western industry. There was little emphasis on high-volume production needs. More on general-purpose equipment for smaller, diversified shops, and precision equipment for such Western-thriving industry as aircraft and electronics.

The two stories and basement of Los Angeles' Shrine Auditorium and Exhibition Hall gave room for an uncluttered show, and unlike other Los Angeles exhibition facilities, provided adjacent quarters for the well-attended technical sessions that were held during the five days of the show.

The booths for the most part were good looking and well-thought-out, and showed the continuing search for something new and different in exhibiting techniques. One company, for instance, called its large booth the "College of Cylinder Knowledge," and dressed staffing personnel in black academic caps and gowns. Another concern, striking the institutional theme, drew much attention with an array of small lantern boxes containing 3-D color slides that explained and pictured the company's services. A small control enabled each viewer to move the slides through at his own pace.

The New Developments

Though the show didn't bring out many revolutions, there were an interesting number of products being shown for the first time:

- One exhibit introduced two brand new types of cemented carbides for use in machining steel. Using titanium metal in place of titanium dioxide as a basic raw material, and thereby reducing the oxygen problem, they're said to combine greater impact strength with maximum crater resistance, substantially lengthening tool life and lowering machining costs.
- Another exhibitor introduced the first universally applied carbide throw-away tips — the first time a company has come out with a complete line of sizes to fit all types of throw-away tool holders.
- There were several novelties in the gage field, among them plain plug gages with a 0.00001-in. tolerance. It's the first time such tolerances have been approached for cylindrical parts. Tolerances may be applied bilaterally or unilaterally.
- The Show saw what was called the greatest advance in vernier caliper design since its invention. Black vernier graduations appear on nonglaring chrome background for easy readability. Vernier plate is twice as long as conventional plates. Machine cut graduations are uniform, make accurate alignment of vernier scale easier. Long bearing surface of sliding jaw reduces deflection.
- A 3-jaw self-centering scroll chuck was shown that can center workpieces to less than 0.0005-in. in less than a minute. It has a single-point adjusting feature that's claimed not to shift under the heaviest cuts. Adjustability and range eliminate the need for collets and stepped collets. You get the accuracy of a 4-jaw independent chuck plus the speed of a 3-jaw scroll chuck.
- Focus of much interest was a universal precision inspection and machining table calibrated for movement in all planes. It has an optical micrometer microscope with glass vernier reticle which permits direct reading to 5 seconds of an arc on a graduated ring with clockwise and counterclockwise markings from 0 to 360 degrees. To facilitate tilting, a power drive mechanism can move the table from horizontal to vertical plane or return in 15 seconds.
- Chemical products came in for their share of attention. An alkaline material for derusting and descaling metal parts was demonstrated for uses where dimensional change and hydrogen embrittlement must be avoided. An all-around cleaner was announced that removes shop soils, grease, heat scale in one operation, and is inhibited against attack on ferrous metals.
- A new line of 14-in. drill presses, in single and multiple spindle models, was notable for versatility, making it especially adaptable to small shops—it can be used for drilling, counter-boring, tapping, routing, mortising, shaping, and many other purposes. Spindle travel is 4-5/16 in. A pivoting motor-mounting plate permits quick belt tension release for easy speed changes. A quick-set depth gage, calibrated down to 1/32 in., gives direct depth readings as drill penetrates, and a serrated sleeve locks depth setting automatically.
- An air-feed drill press making its initial appearance in a production unit puts a 15-in. press, motor and air feed in the same package, for the first time. At a cost, according to the manufacturers of less than a separate air feed. Air feed operates on very low pressures (7-25 lb). Attachment is so simplified that no special tooling or training is required to take hand wheel off, put air feed on the press.
- A 40-ton punch press exhibited has the deepest throat yet—24 in. The press has a single-revolution clutch, hardened and ground ways. It's of one-piece bearing-block construction, bronze-bushed, with an extra-heavy rugged frame.

First West Coast Exposition Draws 40,000

● A smaller press (15 tons) was the first deep-throat model to be inclinable. Multiple-rib frame construction gives sufficient strength that even with the 15-in. throat, there's only negligible deflection when punching up to full capacity. Ram ways at top dead center protrude 2½-in. above the ram guides, thus retaining full guiding power to the bottom of the stroke. Press can be equipped with single- or double-hand control, or foot control. Center of ram hole to back is 15 in.

● A new 14-in. lathe featured variable speed drive—simple turn of a handle gives spindle speeds from 38 to 186 rpm and 240 to 1200 rpm without stopping lathe or shifting belts. Massive, 52100 steel spindle with 1⅜ in. bore revolves on four ball bearings. Oversize, disc-type clutch is handled easily by a convenient lever. Extra wide, long, precision-ground top surfaces on cross slide and saddles easily accommodate gages and indicators. Bed is 68 in. long, 10 in. wide, with high, strong walls braced by oversize ribs.

● In the optical tooling line, there was a new microptic autocollimating theodolite that for the first time permits checking of squareness, as well as position, of target. It gives horizontal, vertical, and compound angle setting and alignment to 1 arc-second.

● New precision index tables for high-speed production were shown that offer up to 500 indexes per minute. Tables may be mounted for either horizontal or vertical use by merely inserting and tightening four bolts. Standard dial sizes run from 12 in. to 48 in., and number of work stations from four to 36. Secret of high-speed indexing is roller gear drive. Index tables are available with ¼, 1/3, ½, or ¾ of the cycle time for movement of the dial and work stations. Standard motor-clutch components are available for remote control of dwell. Clutch-driven units utilize ¾ of the input shaft rotation (270 degrees) for movement of dial.

● Dull tool control was a major feature of a line of drilling machines with self-contained hydraulic locked circuit feed, exhibited for the first time. When drill points get dull (determined by spring tension), machine stops, reverse itself. Circuit is automatically locked, tool must be changed to start again.

ASTE's 23rd Annual Meeting, held concurrently at the Shrine Auditorium and the Ambassador Hotel, featured some 40 speakers in five days of technical sessions covering professional developments, management problems, pressworking, processes and precision controls. Automation, the year's hottest topic in practically every industry, came in for its share of the spotlight.

Automation: No Job Killer

"Automation doesn't throw people out of work, but results in a higher standard of living for everyone," is the opinion voiced by W Fay Aller of the Sheffield Corp. Automation might produce temporary employee dislocations, but a switchover to automation in most plants would be so gradual as to be taken care of by natural personnel loss. In effect, Mr Aller said, the transition is "no different in principle than the change from hand tools to power tools."

Today's automation, he said, must be "simple, easily serviced and dependable." Speaking on the gaging aspects of automation, he said he preferred pneumatic and straight electric-sequenced operations, with all units mounted in the open, so that they can be repaired without tearing down the entire machine. There's no advantage, he said, in eliminating operators only to replace them with skilled technicians. Automation, like machine tools, will vary from plant to plant, and product to product. And a product that will be produced by the millions without change for years poses a different problem from a product subject to frequent change and low-quantity manufacture.

Machine Tools

Today's American machine tools are the world's best investment, according to D E Hawkinson of Greenlee Bros & Co, who said that machine tools can be divided into four broad groups: (1) standard toolroom machinery, (2) standard machines for high production, (3) basic combinations of the first two groups modified to perform specific operations on one or more production parts, and (4) special machine tools designed for a variety of operations on specific workpieces.

High-production machines, he said, are to a "certain extent flexible, but this brings out a startling rule—almost invariably as a machine becomes more productive, it becomes less flexible." One skilled setup man, Mr Hawkinson said, can service a number of high-production machines. That's one advantage, but a basic disadvantage of this type is that the number of operations is limited—on a majority of production jobs they're not efficient. Today's industry demands that more work be combined under the control of fewer workmen.

In selecting a machine tool to fit a specific job, Mr Hawkinson said "special versus standard" is the wrong approach. Each has its uses, and on many production jobs, standard machines or combinations of standards and specials are the most practical. When selecting a tool, preliminary operations should be considered—for example, initial operations on many castings or forgings require complex fixturing to properly target the part. On this, and on parts that distort under clamping or heat created by roughing tools, the preliminary standard machine the preceding and the finishing machine following the special machine is the answer.

These points should be considered in selecting a machine tool, Mr Hawkinson said: (1) production requirements, (2) length of time available for machine procurement, (3) length of production run, and (4) nature of the workpiece.

Panel discussion on plastic tooling brought out this fact—the hardest plastic surface isn't necessarily an indication of the toughest material. Panel discussion also cited the speed of making engineering changes in plastic tools and their lightness in weight as a definite advantage in eliminating tooling tie-ups in the aircraft and automotive industries.

In a panel session co-sponsored by the American Society for Quality Control, C E Deardoff of Bendix Aviation Corp urged industry to be "more tolerant with tolerances" and specifications for precision parts in order to achieve low-cost high production. Airplanes are so complex that designers have to confine their design drawings to new problems in order to keep costs down.

Companies in the News . . .

Borg Warner Corp, Chicago, announces it will make additions to its **Norge Division** plants that will increase automatic washer output 50% and clothes dryers 100%.

Young Testing Machine Co, Bridgeport, Pa, is forming a Machine Tool Division, will manufacture horizontal boring, drilling and milling machines, vertical boring mills, planers and planer shapers. H. Russell Young heads the division.

Westinghouse Electric Corp plans to build a 350,000-sq-ft military electronics equipment plant near Friendship Airport, on the outskirts of Baltimore.

North & Judd Mfg Co, New Britain, Conn, has acquired **E A Bessom Corp,** Salem, Mass, makers of self-locking nuts, will move operations to New Britain soon.

Cleveland Crane & Engineering Co, Wickliffe, Ohio, is adding a 128 x 71 ft $300,000 engineering building to its plant.

Westinghouse Electric Corp will spend upwards of $1 million to modernize its bottle dispenser and water cooler plant at East Springfield, Mass. Expansion is expected to double output.

Master Spline Co, Detroit, has purchased **Amco Gage Co,** Detroit, will move into Amco's plant at 19760 W Eight Mile Rd, Detroit.

Solar Aircraft Co and **William Sugg & Co Ltd of England** have formed **Sugg Solar Ltd** at Crawley, England, to manufacture and sell Solar's gas turbines in Free Europe.

SKF Industries Inc, Philadelphia, has acquired controlling interest in **Tyson Bearing Corp,** Massillon, Ohio. This adds tapered roller bearings to SKF's line.

Douglas Aircraft Co's Santa Monica (Calif) Division plans a $1-million expansion to accomodate production of its DC-7C long range transport, the "Seven Seas." In the cards are five new buildings costing $150,000 each, balance for internal plant conversion.

Lovekin Water Heater Co has completed a 7500-sq-ft addition to its plant, including a new loading dock.

Lamb Enterprises Inc, Toledo, Ohio, has purchased **Rasch Mfg Co,** 50-year-old makers of water heaters, will move new machinery into Rasch's modern plant.

Lockheed Aircraft Corp has acquired the 370,000-sq-ft former Willys automobile plant at Los Angeles, will use it for assembly operations, taking the overload from its Burbank, Calif, plant.

K L Wessling & Co, St Louis, has been named southern-Illinois, eastern Missouri representative for **Leland-Gifford** drilling machines.

Talley Machine & Mfg Corp, Los Angeles, will build a 75,000-sq-ft plant in Ventura County, Calif, doubling its output of actuators and air valves.

Thor Corp's main washing machine plant at Cicero, Ill, will be closed and sold. This doesn't mean Thor is going out of the washing machine business—a new type of washer will be made for Thor by **Avco Mfg Corp's Bendix Home Appliances Division** at Avco's Nashville, Tenn, plant. Sale money will be used to expand Thor into the electronics field.

Motch & Merryweather Machinery Co. Cleveland, has been named Ohio, Michigan and western Pennsylvania representative for **Henry & Wright** automatic dieing machines.

American Locomotive Co, Schenectady, is changing its name to **Alco Products Inc,** in line with the firm's recent diversification into lines other than railroad engines.

Acar Broach Co, Detroit, has opened a new firm, **Acar Die & Mold Co,** in Roseville, near Detroit, to fabricate metal dies and molds to make plastic parts.

Fulton Iron Works Co, St Louis, has acquired **Novo Engine Co's Lehmann Boring Tool Division,** St Louis, will continue its output of boring tools.

National Lead Co, through exchange of stock has acquired control of **Southern Screw Co,** Statesville, N C.

Inland Steel Co has acquired Arthur C Harvey Co, Boston steel warehousing firm.

Remington-Rand Inc and **Sperry Corp** are talking merger. This combine would merge one of the nation's leading builders of electronic equipment; hydraulic, farm and special machinery (Sperry) and one of the biggest U S makers of business machines and office equipment. Total assets of the two companies would be more than $600 million.

Portland Copper & Tank Works, Portland, Me, is adding 21,000 sq ft of production space to its stainless steel fabricating plant.

CIT Corp, industrial financing firm, has opened a Detroit office to handle instalment financing of machinery and equipment.

Burgess-Manning Co, Libertyville, Ill, and **Penn Industrial Instrument Corp,** Philadelphia, have merged under the corporate name of the **Libertyville Co.** Penn will continue to make industrial instruments and flow meters as a division of Burgess-Manning.

LeTourneau-Westinghouse Co is the new name of **R G LeTourneau Inc,** Peoria, Ill, and Toccoa, Ga, makers of earthmoving equipment purchased last year by Westinghouse.

Nems Clarke Inc is the new combined name of **National Electrical Machine Shops Inc** and its **Clarke Instrument Division,** Silver Spring, Md.

Koppers Co Inc, Pittsburgh, recently bought **F X Hooper Co Inc,** makers of corrugated box machinery, will operate it as a subsidiary.

Willys-Overland Export Corp has received an order for 4000 Jeeps from the Dutch government, largest non-US-government order for Jeeps ever received.

Revere Copper & Brass Inc has purchased **Standard Rolling Mills Inc** of Brooklyn, N Y, Chicago, and Newport, Ark, makers of aluminum foil products.

CROSS CO PROMOTES . . A J McLaren, (left), sales manager, to vice president, sales; and **Kurt O Tech,** chief engineer, to vice president, engineering

Harold Ashton, chief service engineer of National Broach & Machine Co, Detroit, has been promoted to manager, sales and service

Names in the News . . .

Frank J O'Laughlin, director of sales, and a member of the management committee of the Commander Manufacturing Co, Chicago manufacturer of production drilling and tapping equipment, has been elected president. He succeeds **J B Chamberlain,** now chairman of the board.

Micromatic Hone Corp, Detroit, promotes: **Don S Connor,** executive vice president, to serve in addition as general manager; **William H Harris, Jr,** vice president, engineering, to vice president and assistant general manager; and **R G Ellis,** assistant chief engineer, to chief engineer.

George A Grossman, a member of the sales organization of the Barth Corp, Cleveland, Ohio, has been appointed sales manager.

C Thorpe Thompson, formerly associated with Brush Electronics Co, has been appointed executive vice president and sales manager of the Cleveland Instrument Co.

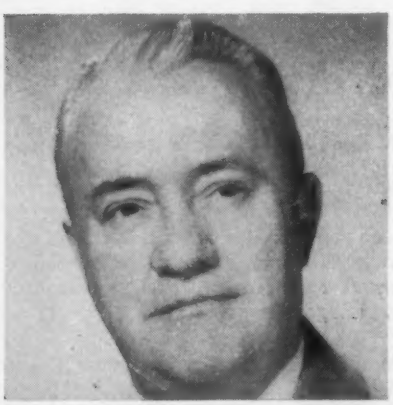
Floyd V Snodgrass, formerly works manager of Pacific Car & Foundry Co's Seattle plant, has been elected vice president, production, of Walworth Co, New York manufacturer of valves and pipe fittings.

Appointments at Borg-Warner Corp's Atkins Saw Division: **John G Deutsch,** formerly sales manager, Acme Industrial Supply Co, to head the Western Industrial Division with headquarters at Los Angeles; **James E Good,** former manager of J H Williams Co's Chicago district, to manage the Central Division, headquartered in Chicago.

Chrysler Corp appointments: **L J Purdy,** vice president of Dodge, and general manager, trucks, to special assistant on the staff of the vice president and operating manager of the corporation; **K C Deacon,** operating manager of the Dodge Truck Plant in Detroit, to succeed Mr Purdy; and **William A Martin,** works manager of the Marine & Industrial Engine Division, to vice president and general manager of that division.

Illinois Tool Works' Shakeproof Division appoints: **A L Pontius,** general manager, Stamped Products Division, Des Plaines, Ill; **William E Bruse,** general manager, Threaded Products Division, Elgin, Ill; **Kenneth C Mackay,** assistant general manager.

Arthur F White has been appointed Detroit district sales manager for Axelson Manufacturing Co's (Los Angeles) Lathe & Milling Machine Divisions.

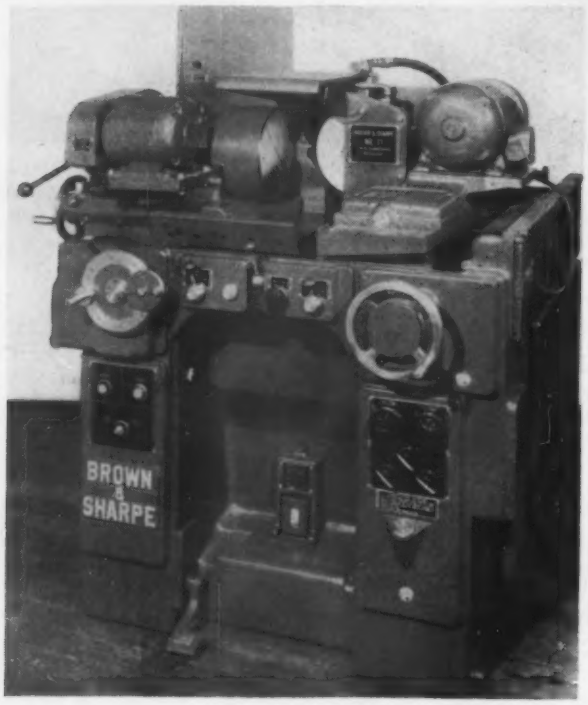


Arthur T Dalton, secretary and sales manager of Chicago Wheel & Manufacturing Co, has been elected vice president, sales

Donald D Gulling, formerly general sales manager of K R Wilson, Buffalo, NY, has been appointed to the new post of equipment sales manager of the Industrial Division of Lempco Products, Inc, Bedford, Ohio

Alfred L Gostow, plant manager of the Dodge Forge plant, has been promoted to manager of methods of Dodge Division of Chrysler Corp

New Shop Equipment,



B&S Face-Grinding Machine Has Horizontal Spindle

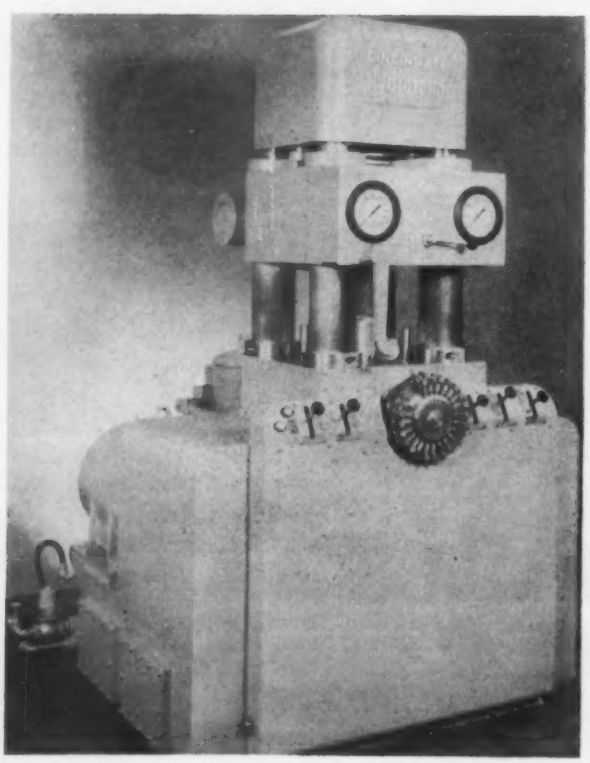
This face-grinding machine, with the work spindle in a horizontal plane, allows use of lever-operated devices such as permanent magnet chuck or face chuck. Grinding with wheel periphery, machine produces accurate surfaces on work to 10-in. dia and 3 in. thick on permanent magnet chuck. Concave or convex surfaces to 10° can be ground.

The wheel slide grinding and truing speeds are readily selected and set, with graduated dial indicating rate. This is equally true of workfeed. Automatic workfeed can be set for inside and outside reversal or inside reversal only. Similarly the dwells from 0 to 2½ seconds are independently variable at the inside or outside or both.

A positive stop is provided for both manual and power feed of the workhead. Choice of manual or semi-automatic control, accurate wheel spindle slide reversal, sealed lubricated spindles, and automatic lubrication are incorporated in the design. Wheel truing by the set-diamond method is another feature reducing cost. During the wheel-truing operation, relative position of finished face of work to diamond remains unchanged.

When machine is equipped with workfeed handwheel power-retraction arrangement (optional) turning knob shuts off coolant and returns workfeed handwheel, workhead, and grinding wheel to the work loading position. The optional automatic cycle and spark-timing arrangement automatically controls spark-out time. Operating at a predetermined rate it permits fast, accurate grinding with less experienced operators.

Brown & Sharpe Mfg Co, Providence 1, RI



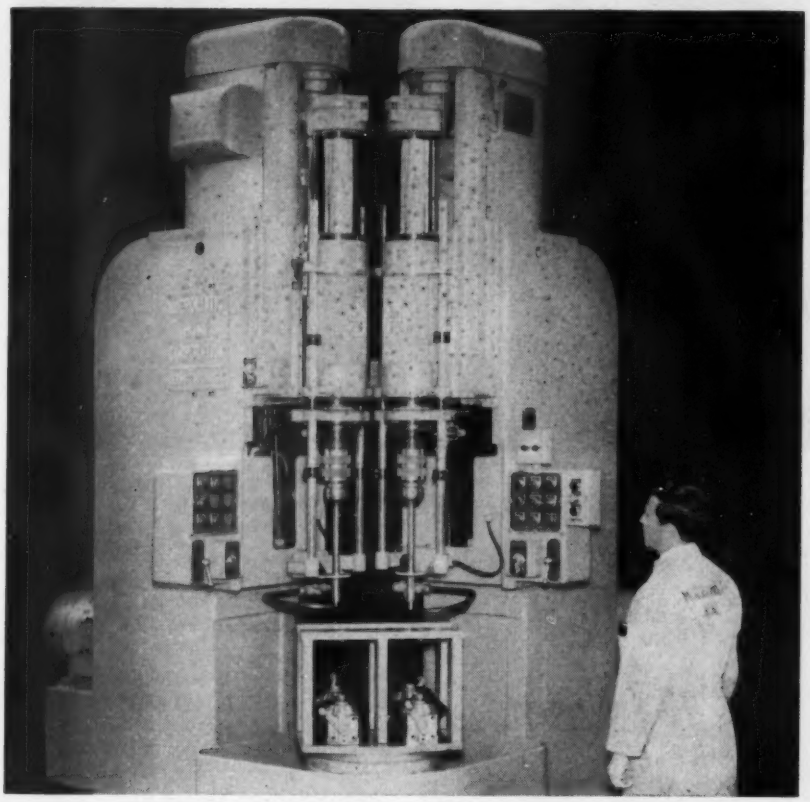
Small Hydroform Machine Added to Cincinnati Line

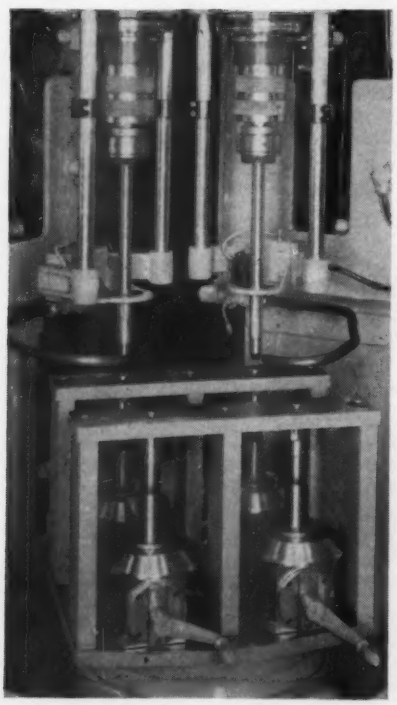
The new 8-in. Hydroform will form parts from sheet metal blanks up to 8 in. in dia with maximum draw depth of 5 in. Sheet metal in gages to ¼-in. steel can be drawn. Maximum operating rate is 200 cph. Machine is floor-mounted, requiring only water and electrical connections. Larger models range from 12 to 32-in. capacity.

Hydroforming embodies use of male punch and flexible die member backed up by hydraulic oil pressure which may be accurately controlled to 15,000 psi. Cincinnati states that flexible die member not only eliminates costly element of normal die set but increases efficiency so difficult parts are made in fewer operations. Bulletin M-1759-3.

The Cincinnati Milling Machine Co, Cincinnati 9, Ohio

Materials and Parts . . .





New Double-Spindle Hydrohoner Announced by Micromatic

Model 730-2 vertical Hydrohoner incorporates two basic units with separate columns for each spindle. It is equipped with the following automatic features: abrasive feedout and stone-wear compensation, sizing, control, coolant start and stop, and time cycle. Three-speed transmission assembly controls rotation on each unit. Reciprocation is hydraulically actuated from 0 to 60 sfm.

Automatic rotary index table controls are interlocked with machine controls. Fixture makes it possible to hone two parts simultaneously while two stations are loaded and unloaded. Same procedure can be used with one-station indexing to hone the same bore progressively.

One installation, finishing transmission converter reaction shafts, achieves 96-sec cycle time.

Micromatic Hone Corp, 8100 Schoolcraft Ave, Detroit, Mich

. . . including

MACHINE TOOLS AND ATTACHMENTS

Preselection Lathe ..... page 166
Automatic Drill Unit ..... page 168
Tapping Machine ..... page 170
Multi-Operation Machine ..... page 174
Horizontal Surface Grinder ... page 178

TOOLS AND ACCESSORIES

Toolholders ..... page 167
Sander-Grinder ..... page 172
Forged HSS Tools ..... page 176

FORMING AND CASTING

Production Press ..... page 167
Hydraulic Press ..... page 168
Electromagnetic Back Gage ... page 176

WELDING AND HEAT-TREATING

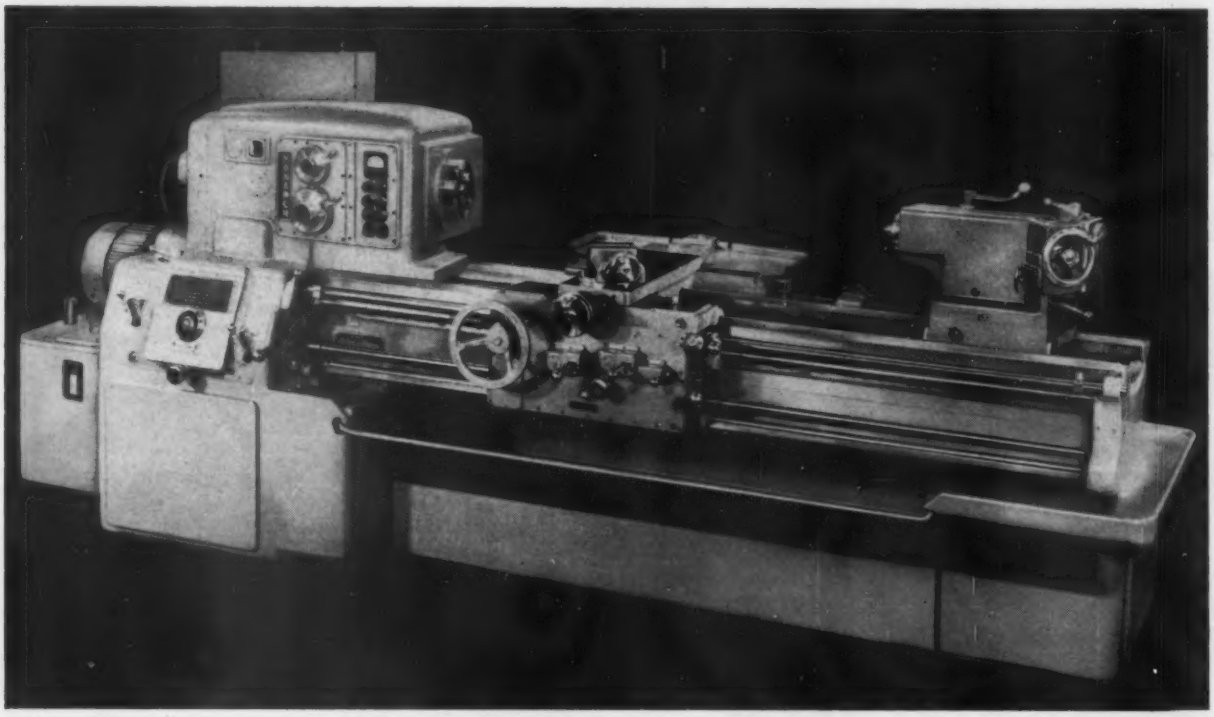
Soldering Unit ..... page 168
Annealing Process ..... page 172
Pickling Aids ..... page 176

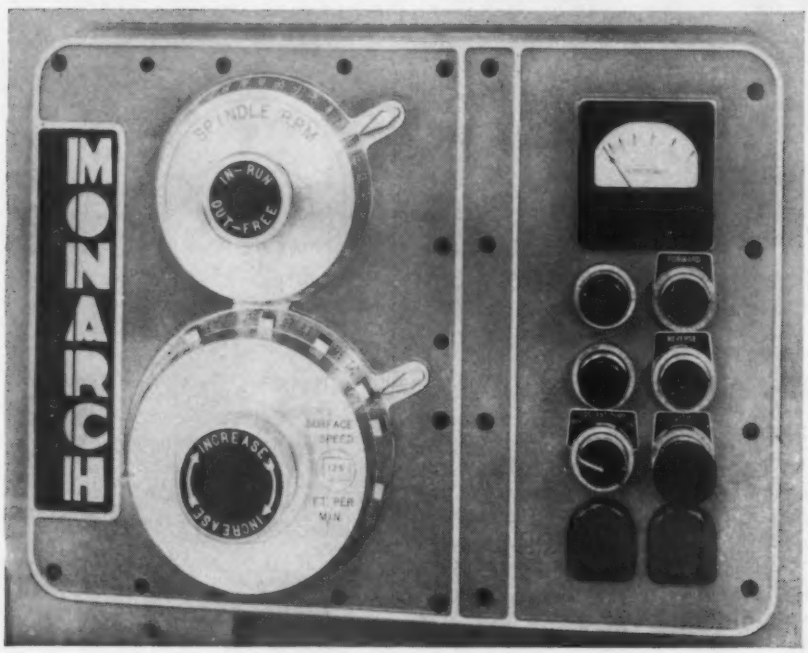
PARTS AND MATERIALS

Powdered Parts ..... page 167
Glass-Reinforced Plastic ..... page 168
Air-Hydraulic Booster ..... page 174

PLANT SERVICE

Coil Cradle ..... page 170
Stand-up Truck ..... page 174
Aluminum-Coated Fabric ..... page 178





New Dyna-Shift Preselector Lathe Has 13- or 16-in. Swing

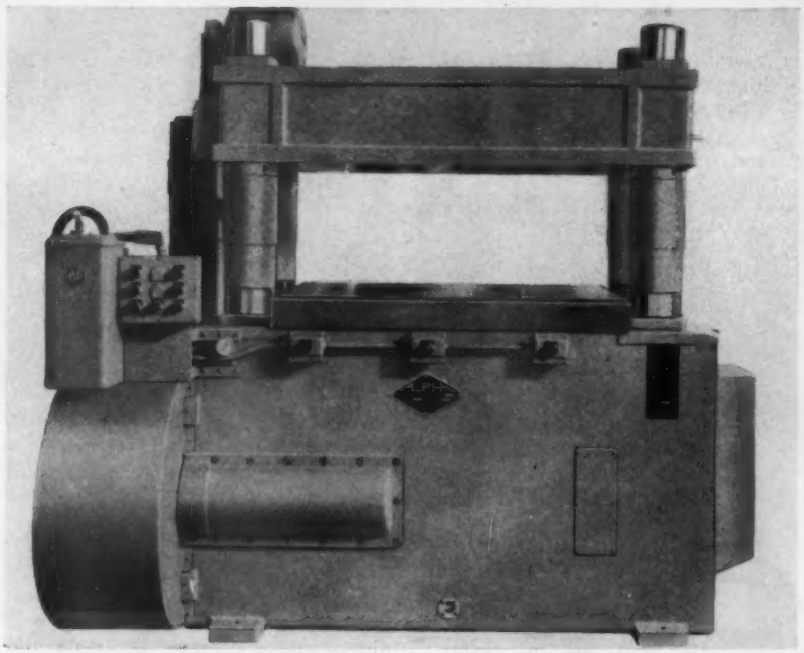
Basis of the design of the new Series 62 Preselector Lathe is the Dyna-Shift headstock first introduced in the Series 90 heavy-duty lathe (AM —Dec 6 '54, p196). Four models are offered—all with 20-hp main drive motor. Model 130 swings 13 in. over the cross-slide, has clearance diameter of 20 in.; model 131 swings 16 in., has clearance dia of 24 in. Models 1130 and 1131 are provided with more accessory equipment for toolroom work, the only inbuilt difference being the method of leadscrew reverse. On 130 and 131 this is accomplished by lever at front of headstock. On the others it is achieved through a design of apron-controlled reverse which makes thread chasing quicker.

As shown, the Preselector Dyna-Shift controls have been incorporated in front of headstock. They consist of: large surface speed setting dial; work diameter setting dial; set of dia preselectors; spindle rpm indicator dial; and knob which frees spindle from gear train. Operator sets dials for work diameter and sfpm required. Surface speed is maintained on succeeding diameters by setting up the values on the adjustable work diameter selectors provided with the new Preselector control. Work stop and start is controlled by lever at apron operating position (with dual lever at headstock end). Levers have three positions—run, brake, and jog.

There are 36 spindle speeds ranging from 14 to 1750 rpm. Drive to the headstock is through multiple V-belts. A 4-way power rapid traverse is supplied for both carriage and cross-slide. The tail-stock incorporates slow speed for drilling and fast speed for traversing the 4¼-in.-dia spindle.

Lubrication of all headstock gears and bearings is through high-pressure mist system. All electrical controls are grouped at front of headstock. Flame-hardened beds have precision ground ways with Shore Sclerescope hardness of 70 to 72. On longer-bed machine, supplementary dovetail way guides and supports traveling rod carriers.

The Monarch Machine Tool Co, Sidney, Ohio

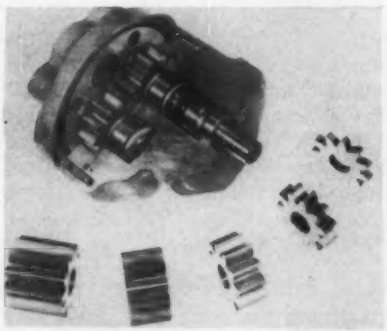


Production Press Has Four-Speed Operating Control Mechanism

This 100-ton production press is 7 ft high and occupies 75x84 in. of floor space. It is equipped with a four-speed operating control mechanism permitting a choice of 40, 50, 60, or 80 spm. Area of bed and clearance are reported unusually large. There is complete clearance between the posts from front to back and left to right.

Drive mechanism is housed in the base and pulls the head down, eliminating overhead thrust and assuring perfect alignment by both punch and die. Design includes forced-feed lubrication system, herringbone back gear, and an air clutch. Two hand-operated safety pushbutton controls and one emergency stop button are incorporated.

Alpha Press and Machine, Inc, 9281 Freeland Ave, Detroit 28, Mich



High-Strength Parts By Powder Metallurgy

Three companies have jointly announced the first successful application of the techniques of powder metallurgy for the production of high-strength machine parts requiring the properties of solid alloy steel. They co-operated in a two-year project to finally develop these high-strength alloy-steel gears fabricated by the powder-metal process.

Vanadium-Alloys Steel Co developed the 4650 pre-alloyed steel powder made by water disintegration of molten metal. Keystone Carbon Co fabricated the powder into gears with tensile strength exceeding 100,000 psi, C-30 particle hardness, and greater resistance to wear than previously used solid gears.

The Hydreco Div of New York Air Brake Co carried out extensive tests of performance and durability and made the final application of the gears to its line of hydraulic pump equipment.

Hydreco states that it approved the gear production after a study of: the uniformity of one gear to another, the superior surface finish on the teeth, the resistance to wear, the high strength, and the subsequent cost reduction.

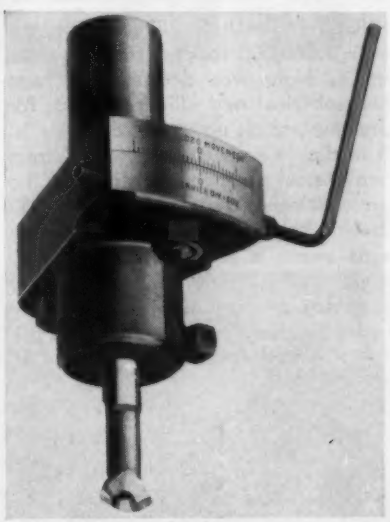
The New York Air Brake Co, Hydreco Div, 1115 E 22nd St, Cleveland, Ohio

Medium-Duty Toolholders Feature Throw-Away Inserts

Multicut toolholder for medium-duty machining operations features throw-away carbide inserts. Positive chip control is provided by adjustable carbide-tipped chip breaker clamp serrated in steps of 0.040 in. starting from 0.050 to 0.060 in. from the cutting edge. Range of adjustment is ⅛ in. for smaller inserts to 5/32 and 3/16 in. on larger inserts.

Rapid one-adjustment insert indexing or changing is possible either from top or bottom of holder since locking screw contains hex sockets on both ends. Extreme front and side clearance angles, coupled with wide range of sizes, include following design features: interchangeability of replacement parts; one-piece anvil-locator plate construction with use of specially treated steel.

Wesson Co, 1220 Woodward Heights Blvd, Detroit 20, Mich

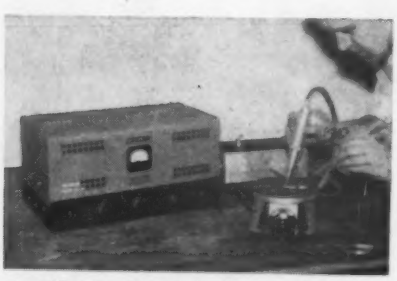


Toolholder by Bokum

A new holder for use with Bokum boring tools on screw machines or turret lathes reportedly permits more accurate and faster boring holes. While the holder is engaged in boring, other tools are free to carry on different operations. The heat-treated alloy steel holders are adjustable to boring positions of vernier accuracy. Calibrated scales on top of each holder make setting accurate.

Bokum Tool Co, 14775 Wildemere Ave, Detroit 38, Mich

HUGE HYDRAULIC PRESS, weighing over 1,000,000 lb and standing four stories high, was designed to form hemispherical and elliptical heads for pressure vessels up to 3 ft deep by 10 ft in dia. Heads will be formed from heavy steel plate in one stroke of the press. It exerts a pressure of 6,000,000 lb with 300-hp electric motor. The main slide exerts a max pressure of 2000 tons; auxiliary slide pushes against it with max pressure of 1000 tons, when hydraulic pump is loaded to 2750 psi. *Verson Allsteel Press Co, 1355 E 93rd St, Chicago 19, Ill*



Small Hand Soldering Unit

Sonobond Model S-1-H-54-12 is a small hand unit for fluxless soldering of wires, small parts, and the repairing of aluminum castings.

Ultrasonic soldering head is 8 in. long, weighs 10 oz. Power in the ⅛-in.-dia tip permits rapid tinning of aluminum, copper, brass, magnesium, or silver. Heat is supplied by a 600-w platen.

Aeroprojects Incorporated, West Chester, Pa

Spot Arc Welder Joins Sheet Metal

Spot arc welding unit developed by Mid-States Welder Co is reported ideally suited to sheet welding applications where it is possible to work from one side of the sheet only.

The process is basically the same as the Heliarc process in that the welding arc is formed between tungsten electrode and work piece shielded by an inert gas. Difference is that the length of time the arc is on is timed so that only a puddle of molten metal is formed. A self-timing device eliminates the danger of burning through. By a flip of the switch the machine can be converted to operate as a Heliarc welding unit and, if desired, the unit can also be used for ordinary metallic arc welding.

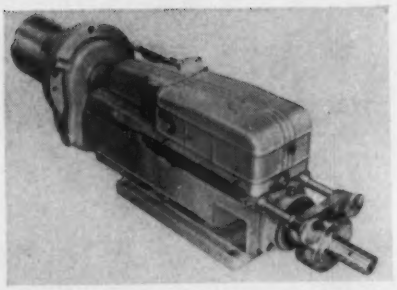
The welder is complete with gas controls, self-timer, heavy-duty magnetic contractor, and remote control circuit; it can be attached to any ac welding power source of approximately 300-amp capacity. A Linde HW-8 Heliarc spot arc torch is recommended for use with the unit.

Mid-States Welder Mfg Co, Chicago,

Hydraulic Switch

Hydraulic pressure switch, piston-operated, incorporates a strain relief mechanism which allows the range spring to absorb impact of a violent pressure surge. Quad ring seal around piston prevents oil leakage and eliminates necessity for oil return line. Available with ranges of 135 to 1000 psi, or 400 to 3000 psi.

Square D Co, 4041 N Richards St, Milwaukee 12, Wis



Automatic Drill Unit Announced by Morris

Two Morris Air-Oil-Matic drill units, with most parts interchangeable, are both hydraulically controlled, but one is powered by oil and the other by air. Units can be mounted vertically, angularly, or horizontally. Feed in both directions is attained by turning setscrew. Units have ad-adjustable feed rate, feed stroke, and quick approach rate. Controls and actuating devices can be set to provide practically any combination of, and sequence of, operations.

Features include: a 6-in. max stroke with feed stroke infinitely variable between 0 and 4½ in.; rapid approach variable from 0 to 6in.; positive stop for spotfacing or counter boring repeats within 0.0005 in.; instantaneous return or delay between feed stroke and rapid return; multiple feed and rapid approaches obtained with special feed dogs.

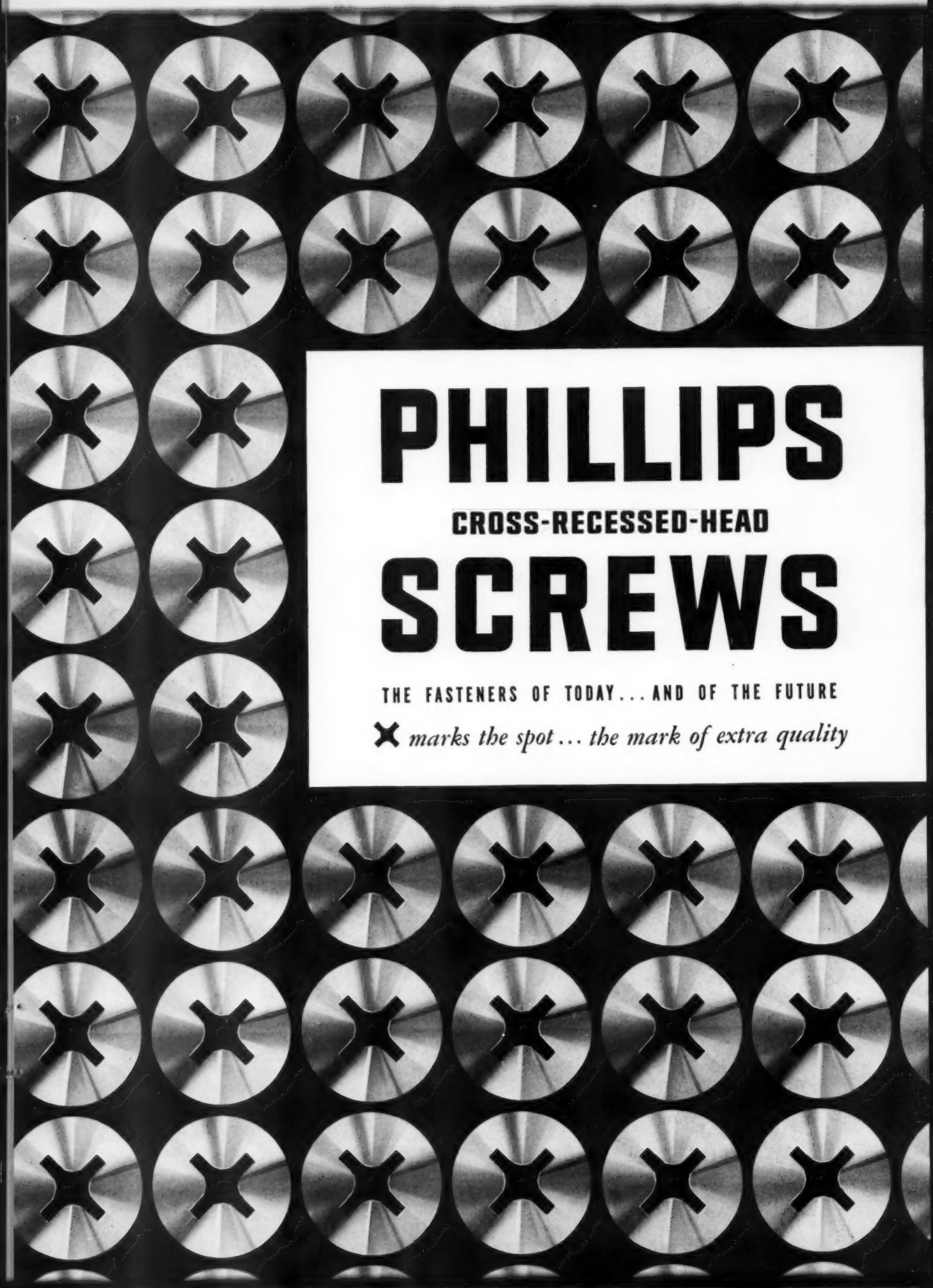
Three methods of spindle drive are provided—gear, pulley or combination of the two—to give spindle speeds ranging from 266 to 5000 rpm. In all cases spindle drive is separate and distinct from feed. Specifications of a typical unit are: size, 33¼ in. long, 11 in. wide and 23 in. high; max hp is 2 hp with approximately 650 lb of thrust, permitting max drill size of ⅝ in. The maximum stroke is 6 in. Feed rate is from 0 to 48 ipm, quick approach from 174 to 300 ipm, and quick return from 174 to 488 ipm.

The Morris Machine Tool Co, Harriet St, Cincinnati 3, Ohio

Glass Reinforced Plastic

This new material uses a special high-temperature phenolic resin which greatly improves retention of physical properties in the temperature range of 300 to 500 F. The plastic consists of fiberglass impregnated with phenolic resins. Both are noncritical materials and the laminate has about twice the strength-to-weight ratio of conventional metals. It is corrosion resistant and has low vulnerability to damage and shock.

Curtiss-Wright Corp, Plastics Div, Carlstadt, NJ


PHILLIPS
CROSS-RECESSED-HEAD
SCREWS
THE FASTENERS OF TODAY... AND OF THE FUTURE
marks the spot... the mark of extra quality

"TERRIFIC TIME SAVERS", says Bryant Heater Company foreman, of Phillips "Sems" used in blower unit sub-assemblies. "We save up to 1½ hours per day with these screws and get much better fastening."

VITAL TO FLEET OF AMERICA, INC., are the Phillips screws used in assembling "Fleetlite" aluminum windows. "Phillips screws," reports the plant manager, "are one factor enabling us to promote the low cost of our units that results from engineered production methods, ease of assembly and low maintenance. We would never use any other type of screw."

TAPPAN RANGES USE MILLIONS of Phillips screws each year in assemblies. "I can't say too much about the fastening qualities of Phillips screws," states a Tappan official. "In fact, I don't know of a single case where they've failed us. We will continue to use them in all future designs."

THEY ALL CUT PRODUCTION TIME AND COSTS

... with Phillips Cross-Recessed-Head Screws

MANY PRODUCTION ADVANTAGES for Tracy kitchen cabinets derive from Phillips screws. The Tracy general manager says, "Our use of Phillips screws has eliminated costly refinishing due to gouging, enables us to train assembly personnel much faster, makes possible our invisible hinge design and helps produce stronger, better looking cabinets."

IN ALL OTIS ELEVATOR SWITCHES. According to an Otis consulting engineer, "Phillips cross-recessed-head screws have rewarded us with greatly increased production, decreased assembly time, a neater installation, tighter and more positive contact, and more positive centering of the driving bits."

MANUFACTURERS OF PHILLIPS CROSS-RECESSED-HEAD SCREWS

THE FASTENERS OF TODAY...
AND OF THE FUTURE

marks the spot
the mark of extra quality

TITAN THERM-O-DIAL HEATERS COST LESS, thanks in part to Phillips screws. A Titan executive states, "With Phillips screws we can utilize a full mass-production assembly, reduce damage and tool replacement and produce more attractive, lower priced items through decreased production time."

Look to these manufacturers for X-tra quality Phillips Cross-Recessed-Head Screws

ALLMETAL SCREW PRODUCTS COMPANY, INC.
821 Stewart Avenue, Garden City,
Long Island, New York

AMERICAN SCREW COMPANY
Willimantic, Connecticut

ATLANTIC SCREW WORKS, INC.
85 Charter Oak Avenue,
Hartford 1, Connecticut

THE BLAKE & JOHNSON CO.
Waterville 14, Connecticut

CENTRAL SCREW COMPANY
3501 Shields Avenue,
Chicago 9, Illinois

CONTINENTAL SCREW COMPANY
New Bedford, Massachusetts

THE EAGLE LOCK COMPANY
Terryville, Connecticut

ELCO TOOL AND SCREW CORPORATION
Rockford, Illinois

GREAT LAKES SCREW CORP.
13631-51 So. Halsted Street,
Chicago 27, Illinois

THE H. M. HARPER COMPANY
Morton Grove, Illinois

THE LAMSON & SESSIONS COMPANY
1971 West 85th Street,
Cleveland 2, Ohio

NATIONAL LOCK COMPANY
Rockford, Illinois

THE NATIONAL SCREW & MANUFACTURING COMPANY
2440 East 75th Street,
Cleveland 4, Ohio

PARKER-KALON Division
General American Transportation Corporation
200 Varick Street,
New York 14, N. Y.

PHEOLL MANUFACTURING CO.
5700 Roosevelt Road,
Chicago 50, Illinois

ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

SCOVILL MANUFACTURING COMPANY
Waterville 14, Connecticut

SHAKEPROOF Division
Illinois Tool Works
2501 North Keeler Avenue,
Chicago 39, Illinois

THE SOUTHINGTON HDWE. MFG. COMPANY
Southington, Connecticut

STERLING BOLT COMPANY
363-405 West Erie Street,
Chicago 10, Illinois

UNIVERSAL SCREW COMPANY
127 South Green St.,
Chicago 7, Illinois

WALES-BEECH CORPORATION
2240 Fifteenth Street,
Rockford, Illinois

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FYI – these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 GRINDING MACHINES — *Gear Grinding Machine Co, Detroit 11, Mich.* Specification sheets illustrate two new Geargrind Automatics. Specifications, features, description of 30-in. internal and 36-in. external form grinding units for working on gears, splines, and specially contoured parts.

● HEAVY-DUTY LATHE — *Monarch Machine Tool Co, Sidney, Ohio.* 26-page illustrated bulletin 1601 describes Series 90 Dyna-Shift, Models 2500, 2501, 2502; spindle speed range from 6 to 750 rpm; 60-hp motor. Designed for carbide tooling on large-size work. New headstock drive facilitates automatically obtaining right surface cutting speed for any given work diameter. Request direct on company letterhead.

2 GEAR PRODUCTION — *National Broach & Machine Co, Detroit 18, Mich.* 11-page brochure illustrates Red Ring rotary shaving machines, principle, features, specifications; covers testing, grinding, broaching practice, and includes bibliography of production methods.

3 MACHINE TOOLS — *Snyder Tool & Engineering Co, Detroit 7, Mich.* 12-page catalog describes automation machines, special machine tools, and mill-balancing machines. Illustrates transfer, center column, and special units for wide variety of metalworking operations.

4 SINGLE-POINT PRESSES — *The Cleveland Crane & Engineering Co, Wickliffe, Ohio.* 4-page illustrated catalog 2019-A covers line of Steelweld units from 150 tons and up. Bolster areas start with 30 x 36 in.

5 BAND MACHINES — *DoAll Co, Des Plaines, Ill.* 20-page catalog describes Contour-matic units for sawing, filing, grinding, polishing, with throat capacities from 16 to 60 in. Includes applications, features, specifications, accessories.

● PNEUMATIC BAR FEED — *Lips-Rollway Corp, Bar Feed Div, Syracuse 1, NY.* 24-page booklet illustrates how unit feeds stock continuously into varied equipment for periods up to 8 hrs. Demonstrates how automatic production overcomes inefficiencies. Request direct on company letterhead.

6 TRIMMING EQUIPMENT — *The Steel Products Engineering Co, Springfield, Ohio.* 12-page illustrated catalog gives detailed description of operation of trimming die and trimming press. Applications and specifications included.

7 TESTING MACHINE — *Minneapolis-Honeywell Regulator Co, Philadelphia 44, Pa.* Data Sheet 10.17-5 describes Baldwin-Emery SR-4 for testing specimens or structural parts and components in tension, compression, flexure, torsion, alternating load, creep, stress, relaxation, and shock, up to a rated capacity of 50,000 lb.

TOOLS AND ACCESSORIES

8 CUTTING TOOLS — *Crobalt, Inc, Ann Arbor, Mich.* 8-page illustrated catalog 55 lists Crobalt cast alloy tools including solid square, rectangular and round toolbits, cutoff blades, tipped toolbits, inserts for vertical toolholders. Three grades described that cover field between HSS and carbide tool applications.

9 MACHINE TOOL MICROSCOPE — *Perkin-Elmer Corp, Norwalk, Conn.* 7-page bulletin illustrates features and applications of Model 11 for all vertical or horizontal units. Works to accuracy of 0.0001 in. Operational data and specifications included.

10 VISES — *Columbian Vise & Mfg Co, Cleveland 4, Ohio.* Illustrated catalog 55 describes complete line. Contains specifications and prices, accessories and replacement parts.

11 HARDNESS TESTER — *Gries Industries, Inc, Testing Machines Div, New Rochelle 4, NY.* 4-page illustrated bulletin A-16 describes Wolpert-Gries "Micro-Reflex" unit with Zeiss optical system, for loads from 10 to 3000 gram. Covers load application, optical equipment, test procedure.

12 CLAMP ASSEMBLIES & FIXTURE PARTS — *West Point Mfg Co, Detroit 19, Mich.* New edition of catalog contains complete line of standard jig and fixture parts illustrated by full-size templets.

13 PUNCHES & PIERCING ACCESSORIES — *Pivot Punch & Die Corp, North Tonawanda, NY.* 26-page illustrated catalog covers all types of stand-

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ard punches available in 1/64-in. increments in three qualities of HSS to cover complete range of performance. Indicates specific uses, sizes available, standard prices.

14 TOOLHOLDERS—*Wesson Co, Ferndale 20, Mich.* 4-page bulletin 552-M illustrates advantages and mechanical features of Multi-cut series for throw-away carbide inserts. Shows typical operations for each of six basic styles. Tabular data on sizes, shank dimensions, prices of holders only, plus information on inserts.

15 SCREWDRIVER WALL CHART—*Bridgeport Hardware Mfg Corp, Bridgeport, Conn.* 22 x 17-in. chart has separate tables for wood, Phillips, and machine screws, showing what type and size to use for each shank size and length. Eleven types are illustrated.

HEAT TREATING AND WELDING

16 WELDING MACHINES — *Expert Welding Machine Co, Detroit 12, Mich.* 54-page illustrated spiral-bound catalog describes line of 46 types of automatic welders for submerged arc, resistance, and Heliarc welding operations. Includes sections on automation machines and special machine tools.

17 SILVER BRAZING ALLOY MANUAL — *Air Reduction Sales Co, New York 17, NY.* 24-page Aircoil catalog 925 contains information on application of major brazing methods in joining metals using silver alloys and filler metals, fluxes, and gas atmospheres. Tabular data, procedure, selection, design, cleaning, assembly, included.

● PREHEATING CHART — *Tempil Corp, New York 11, NY.* Lists recommended preheat temperatures for 79 commonly used metals and alloys. Gives factors influencing temperatures and effects of correct preheating on metal properties. Request direct on company letterhead.

PLANT SERVICE EQUIPMENT

● ZINC PHOSPATE COATINGS — *Oakite Products, New York 6, N.Y.* 10-page booklet illustrates CrysCoat phosphating process for application to steel before painting. Describes materials and action involved to give paint-anchoring, corrosion-resistant coatings, bound to the metal, said to prolong paint life as much as ten times. Application details. Request direct on company letterhead.

18 VACUUM CLEANING SYSTEMS —*Wilson Engineering Corp, Chicago 3, Ill.* 4-page illustrated bulletin 50 describes syphon jet vacuum system, a non-electric, multi-purpose cleaner for heavy-duty use; utilizes compressed air. Applications and techniques outlined.

19 AIR POWER — *Ingersoll-Rand Co, New York 4, N.Y.* 6-page illustrated brochure, "A Better Air Power System" (Form 213-A), describes how to determine air waste, and procedures necessary to bring system up to accepted standards. Data on designs of new systems, diagrams of types of piping networks and tables of friction losses.

20 EYE PROTECTIVE EQUIPMENT —*Watchemoket Optical Co, Providence 3, RI.* 11-page bulletin 100RR offers information on new developments. "Eye Savers" products illustrated and specified.

21 MATERIALS HANDLING — *Flow-mation, Powell Pressed Steel Co, Hubbard, Ohio.* 6-page folder illustrates automatic Flow-mation system for automated factories.

22 FORK TRUCKS — *Lewis-Shepard Products, Watertown, Mass.* "Gas vs. Electric Fact Folder" presents study of capabilities of both types operating under normal conditions. 12 fact sheets answer questions on cost, dependability, service, and relative merits of both.

PARTS AND MATERIALS

23 GEAR DRIVES — *Link Belt Co, Chicago 1, Ill.* 32-page booklet 2619 gives illustrated description of complete line of parallel shaft drives. Lists 39 standard size single, double, and triple reduction ranging from 1.21:1 to 323:1 with hp capacities of over 2000. Contains complete engineering data.

24 BEARINGS — *McGill Manufacturing Co, Valparaiso, Ind.* 52-page revised handbook contains sections on the Camrol, Multirol, Guiderol, and new Sealed Guiderol bearings. Photographs, dimensional and load capacity tables, mounting details, bearing life and speed factors, and interchangeability charts included.

25 NITRALLOY & NITRIDING PROCESSES — *Nitralloy Corp, New York 17, NY.* 48-page illustrated booklet covers subject, including new Floe process. Charts and graphs define compositions, mechanical properties and case hardening capabilities of four principal types of Nitralloy steels. Nitriding equipment and installations, chemical reactions produced, and samples of nitrided machine parts covered.

26 HOSE & FITTINGS — *Weatherhead Co, Cleveland 3, Ohio.* 132-page "Yellow Book" is a comprehensive catalog; tabbed pages indicate separate sections; technical data section includes pressure tables, tube bending instructions, procedures for making hose assemblies, tube wall thickness tables, etc. Service tools and equipment information included.

● REINFORCED PLASTIC TOOLING —*Marblette Corp, Long Island City 1, NY.* 20-page illustrated handbook describes fabrication and indicates uses of plastic tools. Charts list properties of Marblette epoxy laminations used as surface coat and laminating resins. Request direct on company letterhead.

27 INSTRUMENT TRANSFORMERS —*General Electric, Schenectady 5, NY.* 1955 edition of the Buyer's Guide, GEC-1028, is a 100-page illustrated publication containing ratings, ASA accuracy classifications, and prices of all standard indoor and outdoor potential and current transformers. Includes listings of ratio and phase-angle tests, tables of replacement types, mechanical and thermal data.

28 PNEUMATIC CONTROL—TRANSMISSION SYSTEMS — *Minneapolis-Honeywell Regulator Co, Industrial Div, Philadelphia 44, Pa.* 45-page bulletin 1120 describes controllers, applications, operation; pneumatic transmission systems and cascade, ratio, and other interconnected control systems.

29 SCREW MACHINE PRODUCTS — *Wm H Ottemiller Co, York, Pa.* 61-page catalog illustrates company's extensive line. Indexed product sections cover screws, studs, bolts, etc. Tabular data on stock sizes, weights, list prices.

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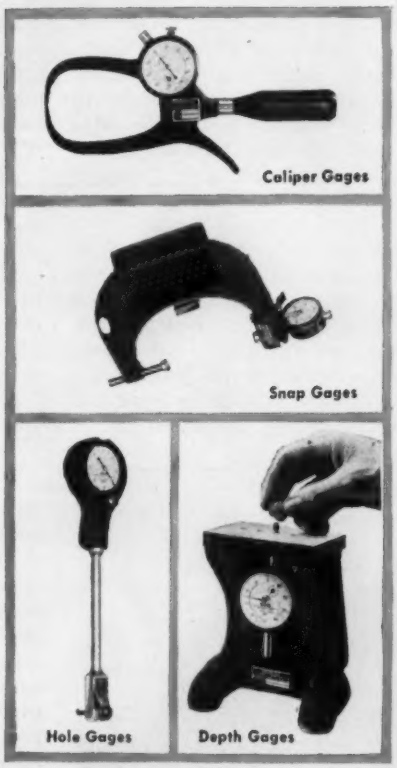

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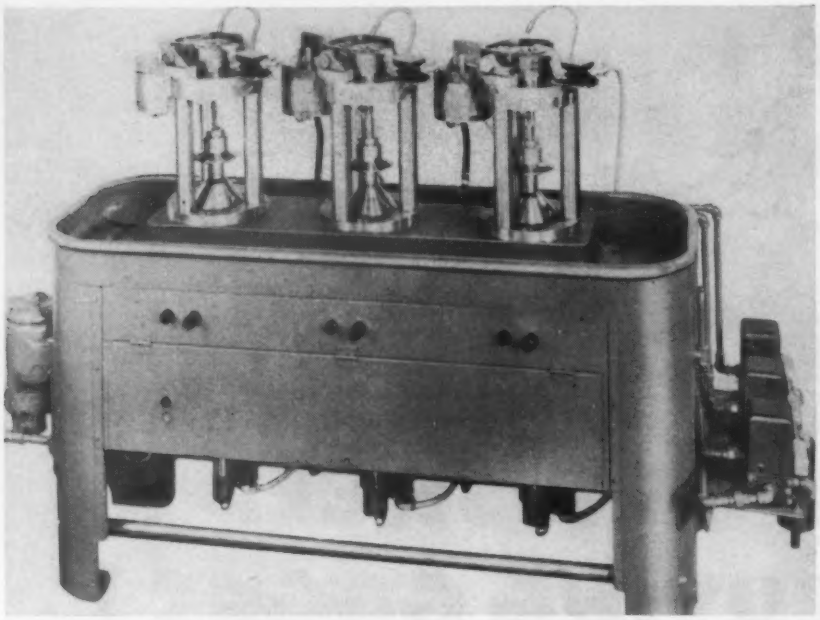


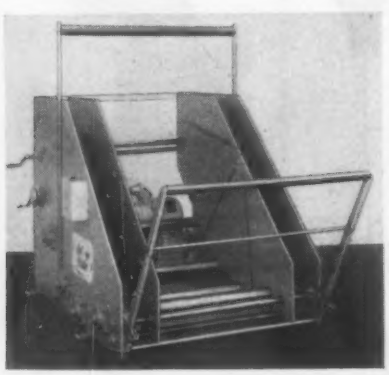
Improved Tapmaster Machine Taps From Underside

Improved Tapmaster, available in five 3-spindle models, has leadscrew relocated to bottom of spindle shaft, use of dial selector to set number of tap turns, and electric brake to halt tap at end of each stroke. Machine will tap hole diameters from ⅜ to 6-in. tap size, with standard stroke to 3 in. Machine is also employed to cut external threads.

Relocation of leadscrew is said to speed changing of leadscrew and nut and to reduce setup time. Forced lubrication is accomplished on each return stroke. To further reduce setup time, original stroke-limit switch located at base of tapping head has been replaced with dual-limit switch control connected to drive mechanism by timing gear. A second limit switch is connected to the air-operated collet fixture so parts are automatically clamped during the tapping stroke and released as the tap is backed out.

An optional development available is a two-speed motor affording normal tapping speed with the back-out speed doubled. The unit can be employed to cut external threads on two heads and tap the same product with the third head. Production rates for straight tapping work are said to run 1800 pieces per hour.

Prutton Corp, 5295 W 130th St, Cleveland 11, Ohio



Special Koil Kradle

The new Koil Kradle of 4000-lb capacity accommodates coil stock up to 32 in. wide and 60 in. in dia. All Koil Kradles supply a loop from which any machine can freely draw with automatic feeding devices. The model illustrated will maintain a loop operating intermittently through its exclusive Variloop control or operating continuously at any selected speed adjusted by means of a varidrive unit. The Koil Kradle can be used in conjunction with punch presses, shears, roll forming equipment, slitters, and similar machines.

Two guide plates operated by crank may be adjusted to desired width capacity, centering the coil stock on the power-driven rolls. Each guide plate is equipped with a series of hardened and radially mounted rolls to reduce side friction of the stock.

Benchmaster Mfg Co, 1835 West Rosecrans Ave, Gardena, Calif

IBM Control System Switches Factory Circuits

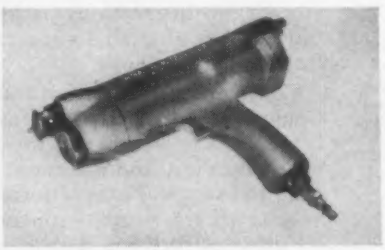
Automatic control of motor, lighting, pumping, and any machine circuits is possible with a Central Control System developed from the old time-clock-control idea. A central control board contains pre-programmed control drums that, with a transmitter, send out control signals to receivers at switches throughout the plant.

The system allows setting up starting time for plant machines and lights, and will continue to start them at the same time each day until the program plate is changed or unless manual switching over-rides the automatic signal. System may tie in with automated machines if desired.

Relays, programming units, power supplies, and transmitters are designed on a plug-in basis so capacity can be added at any time. One relay is required for each electrical circuit to be controlled; but one control panel will handle up to 40 circuits. Number of transmitters required depends on length of power line to be controlled.

System is carrier-current type, where coded signals to operate various switching relays are imposed on the regular AC power lines of the plant or building.

International Business Machines Corp, 590 Madison Ave, New York 22



Winslow Nutplate Drillmotor

This new tool is designed expressly for the aircraft industry and other quantity users of Nutplate and Cowling-type fasteners. Tool performs the total function, formerly reported to consume from ¾ to 3 min per installation, in average of 2 to 4 sec. The operator inserts an expanding collet into the hole to which the Nutplate is to be applied and pulls the trigger. Tool is automatically clamped to work and drill countersinks feed downward to stop. Feed of drill countersinks is accomplished under air power and controlled by hydraulic checking mechanism. Drill countersinks are individually adjustable for depth in increments of 0.001 in. by means of knurled thimbles.

Winslow Products Engineering Corp, 47 St Joseph St, Arcadia, Calif

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601 Manbel St., Manheim, Pa.

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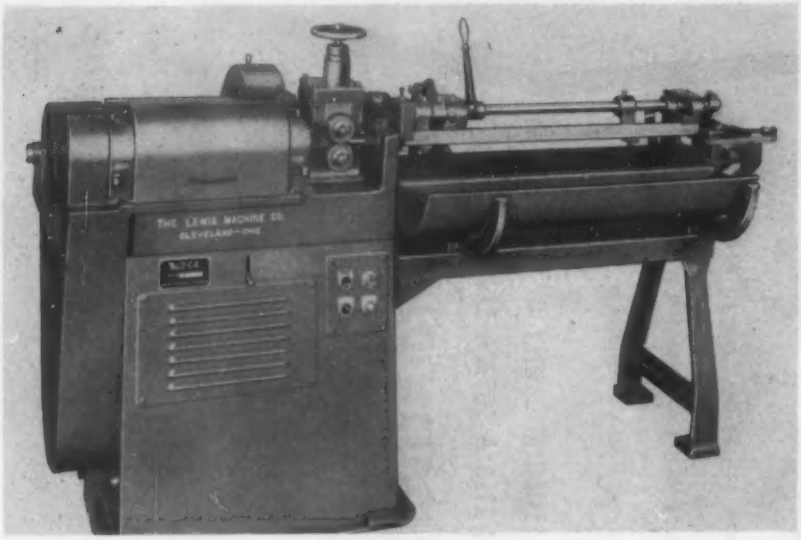
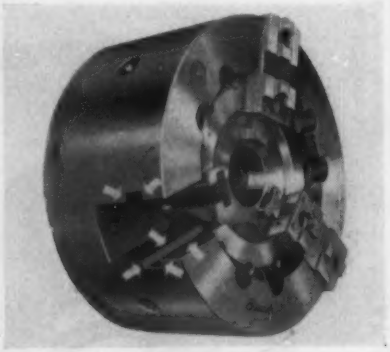


Lewis Wire-Straightening And Cutting Machine

Two models of wire-cutting and straightening machines, No. 2-C3 for wire from 1/16 to 3/16 in., No. 2-C4 for wire from 3/32 to ¼ in., feature minimum vibration obtained by exceptionally rigid straightener arbor-support brackets. The completely enclosed arbor guard keeps oil off machine and V-belts. Solenoid-operated trip mechanism is recommended by Lewis for small-diameter wire sizes.

Machines incorporate higher speed five-die straightener arbor mounted on ball bearings. Additional design factors are: heavy-section V-belts with large pulleys; flush-mounted electrical control buttons; ability to process all common materials.

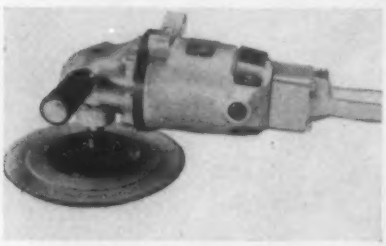
The Lewis Machine Co, Dept 2E, 3441 E 76th St, Cleveland 27, Ohio



Buck Air Chucks

Air chucks with hardened keyways as a standard feature are available for chucking machines. Important bearing surfaces, indicated by arrows, are hardened to increase wear and chuck life. Hardened key ways have been possible in the past only on special order. Chucks are made in 10- to 12-in. dia with 2 or 3 jaws.

Buck Tool Co, Kalamazoo, Mich



Black & Decker Introduces Heavy-Duty 9-in. Sander-Grinder

This new 9-in. heavy-duty sander-grinder weighs 4 lb less than previous B&D model. Tool is available in three different speeds and has B&D-built universal motor designed for continuous-production duty. A centrifugal fan pulls increased amount of air through commutator section, and also keeps motor free from carbon and dust. Field case is constructed to deflect exhaust air away from operator.

Lower steel inspection plate has been designed to act as rub-cover and seal lower side of tool from abrasive dust. Rear handle is large enough to afford ample finger room and side handle can be mounted on either right or left side.

The sander-grinder is available with 4200, 5200, or 60000 rpm and it may be obtained with either a 115-v or 220-v universal motor. Its overall length is 18 3/16 in. and its weight 14 lb.

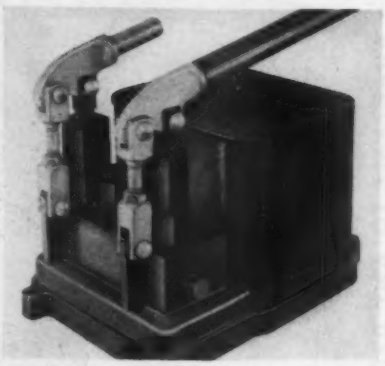
The Black & Decker Mfg Co, Towson, Maryland

Kinetics Corporation Process Removes Hydrogen from Titanium

Kinetics Corp was formed for the process of removing hydrogen from titanium through high-vacuum annealing. High-vacuum furnaces, specially designed and manufactured by High Vacuum Equipment Corp, are used. Retorts of furnaces have hot-zone of 26½-in. ID by 27 in. long and will accomodate coils, strips, wire, formed pieces, castings, and billets.

According to tests reported by Kinetics, the tensile strength of titanium can run as low as 60,000 psi when small amounts of hydrogen are present, but after removal, tensile strength can be increased to 160,000 psi.

Kinetics Corp, 43 Leon St, Boston 15, Mass



OTC Hydraulic Pump Is a Two-Speed Unit

A two-speed, hand-operated hydraulic pump introduced by OTC has two separate pumping units which permit variation in operating speed of ram, jack, or other pieces of equipment. One piston is ¾ in. in dia and delivers 3000 psi, while other is ½ in. in dia and delivers 10,000 psi. By changing pump handle either pump can be put to immediate use.

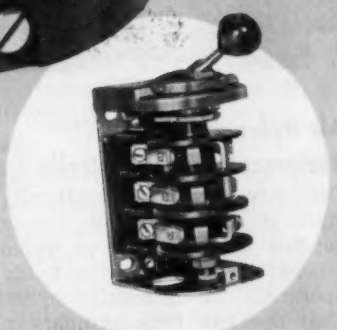
The oil reservoir has a 1-gal. capacity. It is built of cast aluminum and is an integral part of the base. Pumping unit may be purchased separately for mounting on specialized equipment and may be used with any desired capacity reservoir. The unit has three high-pressure outlets and one low-pressure outlet. An overload valve is a built-in feature.

Any combination of piston diameters from ⅜ in. to ¾ in. provides 20,000 to 3000 psi.

Owatonna Tool Co, 383 N Cedar St, Owatonna, Minn

NEW SIZE 1 REVERSING DRUM SWITCH

with advanced design and appearance matching the popular Size 0



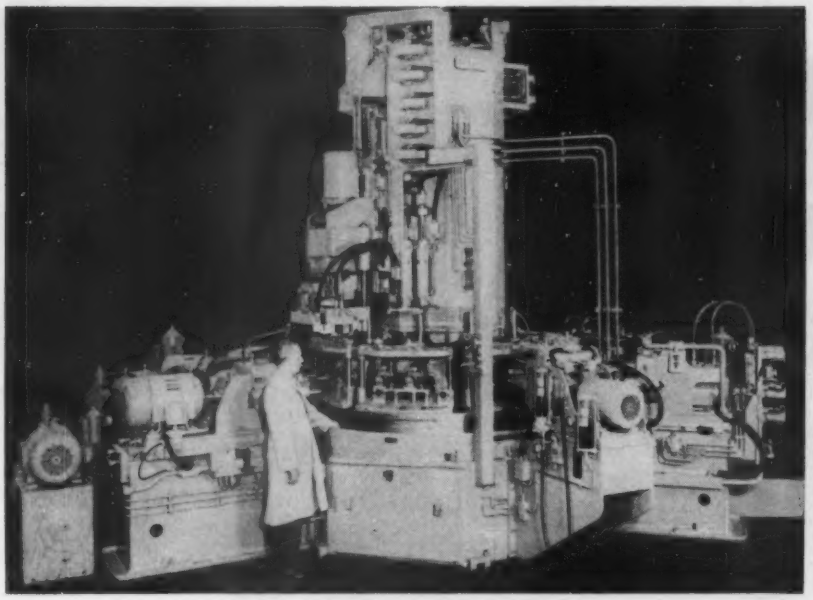
Comparison Proves It...
This Drum Switch Leads the Field!

• Convertible (without tools) from maintained position to spring return • Compact size • Modern streamlined styling • Long electrical and mechanical life • Pressure wire connector terminals • Generous wiring space • Single captive cover screw • Two ½" conduit openings

Write for Bulletin 2601
Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

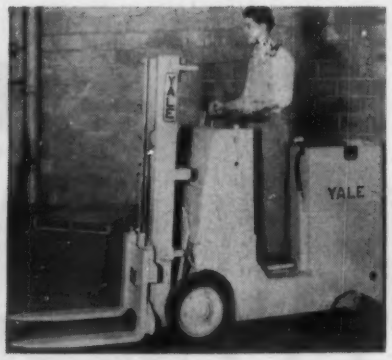


Snyder 96-in.-Center-Column Multi-Operation Machine

Eight-station automation machine featuring 96-in.-dia index table produces 230 cast-iron automotive steering gear housings per hour. It is adaptable to close-tolerance boring, drilling, tapping, facing, and line reaming operations on variety of parts. The 14-ft-high center column has hardened and ground flat ways. Equalizing clamp fingers are provided on vertical heads on stations where core-drilling work is done on parts with long unsupported length.

Table is indexed hydraulically through fluid motor and gear train. Centralized lubrication is provided. The preset tool concept is used — tools mounted on control board.

Snyder Tool & Engineering Co, 3400 E Lafayette Ave, Detroit 7, Mich



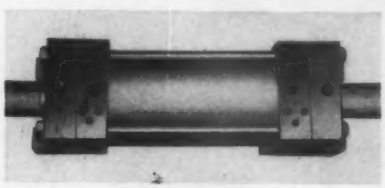
Electric Stand-up Hydraulic Lift Truck

This new Yale stand-up electric truck, the K-46, is available in 2000, 3000 and 4000-lb capacities with top speed at full load of 4½ to 5 mph. It will carry the load up a 10% grade and has a lifting speed of from 37 to 40 fpm. Under 28 in. in width, standard models are available with 68, 83, and 90-in. mast heights. The truck will right-angle turn in a 58-in. aisle and features 5° forward and 10° backward tilt.

The operator stands in the center of the truck and can mount or dismount from either side. Hoist, directional, and speed controls are located near steering wheel. Power is cut off and brakes applied automatically when operator leaves truck.

Truck is equipped with two trailing steering wheels which turn at an angle to provide maximum maneuverability. Truck is equipped with Yale magnetic Cam-O-Tactor controller which insures smooth acceleration and time delay action between each of the four forward and four reverse speeds.

The Yale & Towne Mfg Co, 11000 Roosevelt Blvd, Philadelphia 15, Pa



Air Hydraulic Booster Reciprocates Automatically

Continuous-action, automatically reciprocating air-hydraulic booster is capable of delivering an unlimited amount of high pressure fluids for operation of hydraulic cylinders. Unit operates from ordinary plant air supply, and while it does not build up its pressure nor discharge its oil as fast as single-acting B4 booster, it offers operational advantages and cost savings in applications where large volumes of high pressure fluid are required. Essentially it consists of a double-rod end air cylinder with hydraulic discharge pressure chamber at each end. It delivers a pressure output stroke in both directions.

At end of each stroke, piston assembly contacts actuator button on inside of cylinder. This operates actuator which shifts the position of a four-way, two-position, double pilot-operated valve causing reversal of air flow and stroke.

The booster is available in all ratios to give pressures to 10,000 psi and over. It is stocked for delivery in 25 to 1 ratio units producing 2000 psi hydraulic output from 80 psi input and consists of 5-in.-dia air piston driving two 1-in.-dia hydraulic rams, each with stroke of 6 in. and 4.7-cu-in. displacement per stroke.

Miller Fluid Power Co, 2040 North Hawthorne Ave, Melrose Park, Ill

Air-Powered Grinder

Air-powered 3-in. grinder, Model 7600, weighs 5½ lb; length, 16¾ in.; diameter, 2 1/32 in.; speed, 17,000, 14,000, 12,000, 9000 rpm (governed); spindle ⅝ x 11, ½ x 20, ⅜ x 24 in. Features include: multiple ball bearing spindle; directional exhaust deflector; internal ball bearing governor; built-in automatic oiler.

Aro Equipment Corp, Bryan, Ohio

Shearcutter Metric Taps

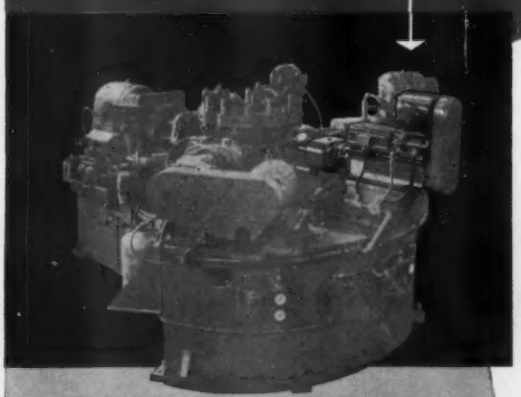
Standardized metric taps are being produced in all sizes and pitches as a stock item by Shearcut Tool Co. Tools are made with high-spiral flutes reported, together with high-spiral cutting edges, to give longer useful life. Made from HSS and ground from solid after hardening, tools are said to allow higher speeds and thus cut production costs.

Shearcut Tool Co, 7045 Darby Ave, Reseda, Calif

New MORRIS AIR·OIL·MATIC DRILL UNITS

air power • hydraulic control or all-hydraulic models

Unit Type Six-station automatic indexing machine for drilling, tapping and facing a master brake cylinder. The Air-Oil-Matic unit shown drills two .026" diameter holes at 10,000 R.P.M. in cast iron.



perfected to give exceptional versatility for higher production at lowest cost

Here's the automatic drilling unit you've been looking for! The Morris AIR-OIL-MATIC Drill Unit is a powerful package of precise versatility developed and perfected by one of the nation's leading manufacturers of high production drilling machinery. Now, this compact unit (air or oil powered and hydraulically controlled) is available for your use in special purpose machines.

Designed for a wide range of drilling, reaming, chamfering, spot facing, hollow milling, centering and related operations, it can be mounted in vertical, angular or horizontal positions. The Morris AIR-OIL-MATIC Drill Unit has adjustable feed rate, feed stroke, total stroke. Controls and actuating devices can be set to provide almost any desired sequence of operations. (see condensed specifications)

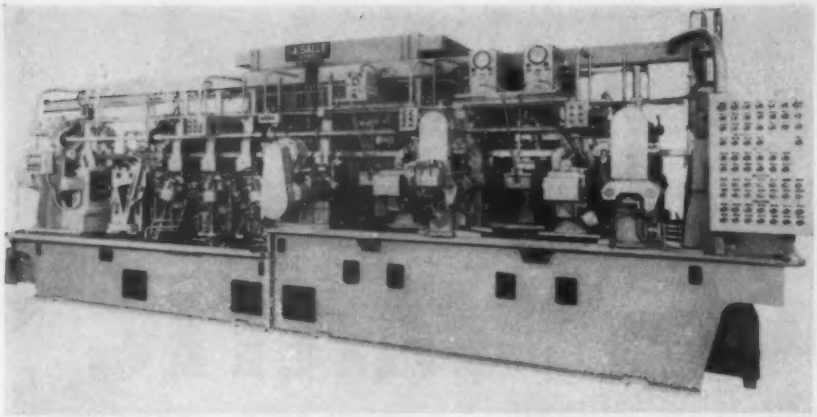
If you have mass production operations involving drilling or related operations . . . you'll want to know all about the Morris AIR-OIL-MATIC Drill Unit. New literature describing the unit, its advantages and applications and complete with specifications, is available on request.

CONDENSED SPECIFICATIONS

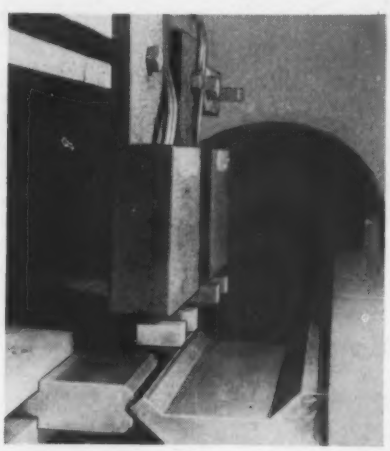
Length, width, height	33¼" x 11" x 23"
Maximum HP at 1800 rpm	2 HP
Spindle speeds	133-6900 (Standard) (Special speeds on request)
App. maximum thrust	650 lb.
Maximum drill size	⅝"
Maximum stroke	6"
Maximum feed stroke	4½"
Feed rate range	0 to 48"/min.
Quick approach rate	480"/min.
Quick return rate	300"/min.

Morris MACHINE TOOL COMPANY

933 Harriet St., Cincinnati 3, Ohio



AUTOMOTIVE PISTONS are processed on this LaSalle automated piston line. Nylon suspension fingers lock each piston in position for all operations. Illustrated is that portion of the line which performs: load and position; rough bore and chamfer wrist pin holes, both sides; check wrist pin hole with air gages; idle; machine snap ring grooves, both sides; air gages check snap ring grooves; idle; saw two slots in oil ring groove; idle; mill valve clearance in head of piston; remove center boss; shuttle mechanism; brush valve clearances to remove burr; and unload station — *LaSalle Tool, Inc, 3840 Outer Drive, Detroit 34, Mich*



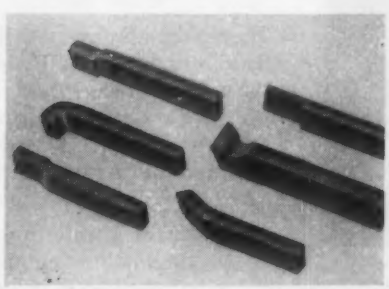
Magnetic Back Gage Prevents Accidents

The AAC electro-magnetic back gage holds material while the ram is in motion, enabling operator to keep hands clear. It is not necessary to feel whether sheet is against back stop since it is magnetically drawn to it. It is reported that unit permits one man to handle large sheets easily and safely where two men are normally required.

Accuracy is maintained because the magnetic force draws material evenly to gage and holds it securely, preventing rocking of oblong pieces. Multiple punching and various other press brake operations are performed accurately. The gage will also form several pieces simultaneously, making it unnecessary to stop after each individual bend to turn the piece for the second bend .

Current to the AAC gage block is automatically supplied by magnetic gage control. To allow full bending action magnets are on at top of stroke and off when ram engages metal. Accessories provide for sequence control in step gaging and single pushbutton control to permit turning magnets on or off at will. Differently shaped removal gage block fingers are available for a variety of work.

American Actuator Corp, 219 E 44th St, New York 17, NY

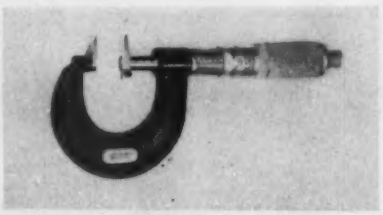


Forged HSS Tool

Nelco Tool Co guarantees its forged HSS tools to out-perform all others, claiming that it is a special process of forging which makes each tool stronger than the metal from which it is formed.

It is said that in conventional cutters, the grain structure of the blank is parallel and weakens the tip of the tool. In Nelco tools the grain structure coincides with the contour of the tool and cutting is done with side grain.

Modern Tools Division, The Nelco Tool Co, Inc, Berlin, Conn



Span Micrometer Measures Spur or Helical Gears

Span micrometer measures spur or helical gears having odd or even number of teeth without need for master gears or accessory pins or balls. Model 1002 was designed for measurement of medium pitch (32 to 2 DP) gears. Design eliminates tendency for spindle to rotate when micrometer is rocked to check feel. All sizes have standard 0.0001-in. vernier.

To measure a gear the Span dimension is first found from tables furnished for spur gears and gear is measured by opening micrometer a little larger than computed dimension and inserting anvils into tooth spaces until anvils touch root. Close and read the feel. The difference between the micrometer reading and the Span dimension is the amount of base backlash cut into the gear.

Sensory Devices Co, Box 204, New Vernon, NJ

Three Pickling Aids Announced by Houghton

Two new pickling aids plus an improved version of an established heavy-duty inhibitor are: Acitrol 3129, an improved non-foaming heavy-duty inhibitor effective over a wider range of conditions; Acitrol 3130, foam-producing pickling inhibitor specially useful for bright work; Acitrol Foam 25, a new cationic foam-producing chemical which can be used in any desired concentration.

The polar activity feature of Acitrol 3139 assures maximum speed and efficiency in pickling, even at temperatures above 180 F. Inhibitor needs no pre-mixing, offers high stability and reportedly maintains its effectiveness over extended periods of use or storage. The high wetting out and detergency ability of 3130, plus its foaming action, increases pickling speed and minimizes drag-out losses. A dense continuous foam blanket is produced by 25, which is free of all sludge-like contaminants. Reported to have superior wetting action, it assures fast acid penetration into the scale layer and promotes speedy rinsing.

E F Houghton & Co, 303 W Lehigh Ave, Philadelphia 33, Pa

Johnson's Wax Cutting Fluids

"Johnson's guarantee speaks louder than claims"

Guarantee of Performance

Wax-Cool **Wax-Cut** **TL-131 Coolant**

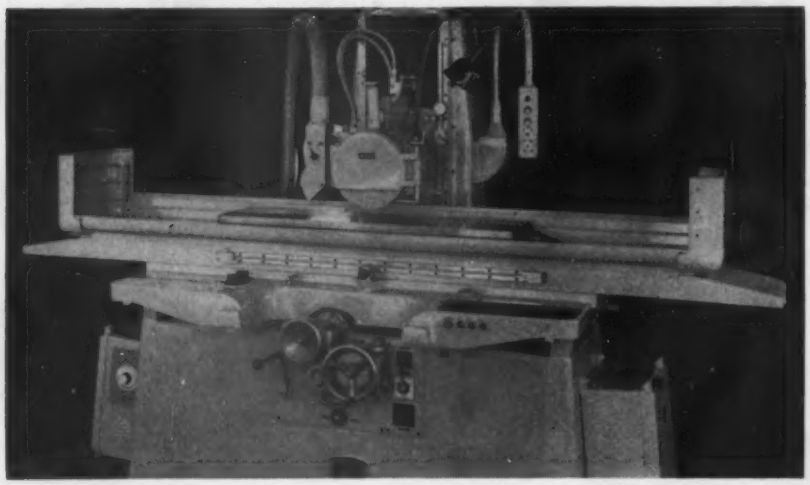
We guarantee the superior performance of Johnson's Wax Cutting Fluids. The full purchase price will be refunded if any of the above products fail to meet the following conditions in your plant, in actual production, *provided* they are used according to our instructions.

1. Provide increased tool life.
2. Provide greater production where increased speeds and feeds can be employed.
3. Eliminate formation of undesirable deposits on machine tools.
4. Gain operator preference.

That's the story of extra profit possibilities in a nutshell. These Johnson's Wax products are stocked by a leading industrial supply house in your area. A shop test is easily arranged there . . . or write:

PRODUCTS OF JOHNSON'S WAX

S. C. JOHNSON & SON, Inc.
Industrial Products Division, Racine, Wisconsin



Horizontal Surface Grinder Introduced by Maserati

The Blohm horizontal surface grinder has a 5-hp motor mounted directly on the spindle which works on adjustable tapered bronze bushings with pressure lubrication. The saddle and table are carried on ball bearing assemblies operating on hardened, precision-ground, chromium-nickel steel ways. Wheels to 4 in. in width can be used with cross feed up to 2½ in. per stroke.

Featured on the machine is the Blohm Microtip infeed and depth-feed control. After a rough hand adjustment, device allows pushbutton control of cross feed to 0.0002 in. and depth to 0.00004 in.

The optional Finimatic device enables the machine to carry out the complete grinding cycle after setup is completed.

Maserati Corp of America, Westbury, NY

Taper Cutting Unit

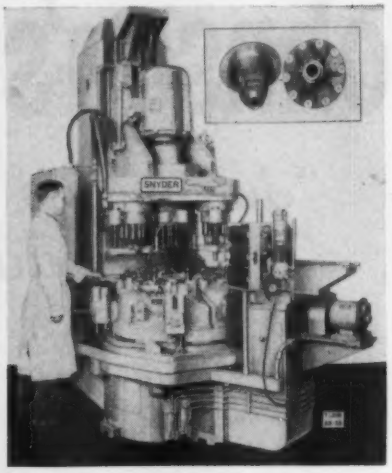
This lathe tailstock attachment is reported to enable precision cutting of tapers without disturbing straight work alignment or disconnecting the cross carriage. Designated Taper-Tail the unit is inserted in the tailstock in place of the center used for straight work. Equipped with a micro-screw adjustment and positive locking device it enables tapers to be cut up to 3-in. offset for work as long as the full length between centers. The taper attachment uses a carbon ball-tip center which provides spherical contact at any angle and gives long life at high speeds.

L A Fitzer Tool Works, Villa Park, Ill

Aluminum Coated Fabric For Protective Garments

An aluminum coated fabric for use in protective garments for industrial hot jobs protects the wearer by reflecting radiant heat instead of insulating against it. Material is flexible and weight half as much as other protective fabrics. A thin aluminum coating is applied on a light asbestos fabric base. It is reported that field tests show fabric gives workers better protection, allowing them to work in heat for longer periods of time—molten splatter rolls off.

Minnesota Mining & Manufacturing Co, St. Paul, Minn

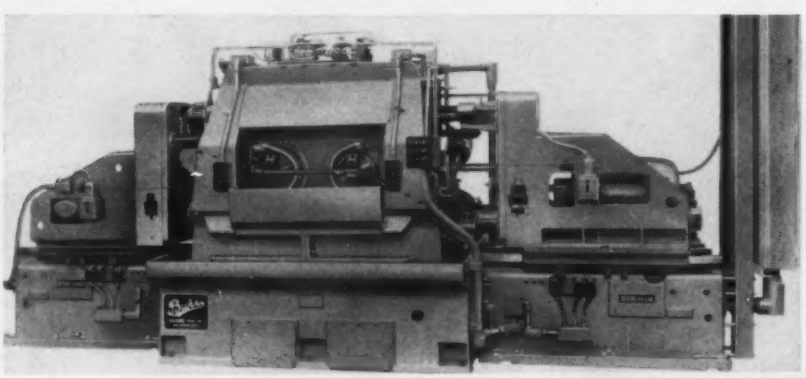


Special Machine Processes Automotive Differential Cases

A new automatic-cycle special-purpose machine for processing automotive differential cases is a five-station, vertical index which drills, spotfaces, and reams ten flange holes in either of two similar differential carriers of malleable iron. Part change is made through fixture designed for adapter change. Part is clamped hydraulically and proceeds through automatic cycle to automatic unloading accomplished by cam-operated, scissors-type fingers.

Tools are HSS with speed of 80 sfpm and feed rate of 7 ipm. They are mounted in a 15-in.-stroke vertical head which is equipped with heat-treated and shaved gears. Unit moves on hardened-and-ground flat slide ways. Index table is hydraulically operated. Coolant is supplied from tank mounted beside machine; lubrication is manually controlled by handle near loading station. Production is 220 pieces an hour.

Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich



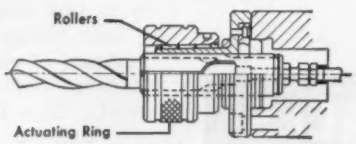
REAR-AXLE SHAFTS are processed at 147 per hour on these two-way horizontal hydraulic feed Buhr Specials. Machine center drills both ends, drills two ½-in.-dia holes in large end and faces small end of these shafts. Each has three stations, single-place trunnion-type holding fixture, arranged with automatic indexing and automatic clamping. Features common to all Buhr Economation units are included —*Buhr Machine Tool Co, Ann Arbor, Mich*

SCULLY JONES

"Precision Holding" Tools reduce costs by saving time and eliminating errors at the spindle!

"Roll-Lock" Chucks add accuracy and dependability to reaming operations!

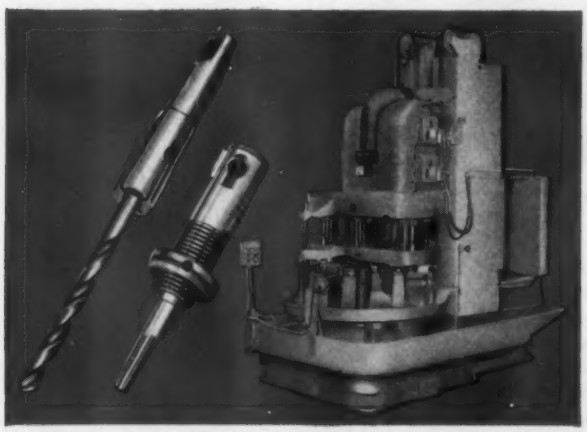
This Greenlee Transfer Unit is equipped with sixteen Scully-Jones "Roll-Lock" Tool Chucks, which provide a completely different and advanced method for holding and driving reamers. Operator merely twists the actuating ring to produce an accurate, centering *shrink fit* on shank of reamer. There's no clearance or play . . . positive, *rigid* holding permits high production of *straight, round* holes. "Roll-Locks" give you accuracy within "tenths" for both production and toolroom operations, yet operate so easily! Save setup time, production time, and tool life with this improved method of driving straight and taper shank cutting tools! Write for Bulletin No. 17-50.



Collet has presetting adjustment

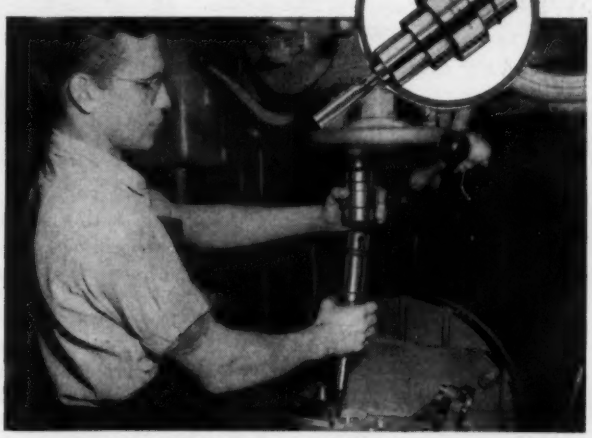
Adjustable Adapters and Drill Chucks speed tool changes, increase accuracy!

Michigan Drill Head Company equips its machine spindles with exclusive features found only in these improved Scully-Jones Tools. Quick-Lock Adjustable Adapters, with new "keyhole" drift slot, eliminate damage often caused by hammering on conventional drifts . . . make tool changes faster and easier. Scully-Jones Drill Chucks, with improved four-slot design, provide improved seating and collet action . . . greater resistance to pull out . . . added protection against tool breakage and production shutdowns. Look for *new ways* to protect your spindles with Scully-Jones "Precision Holding" Tools! Write for Bulletins No. 6-50 and 1-50.



Quick-Change Chucks speed sequence operations on radial drill!

This radial drill at Caterpillar Tractor Company does sequence operations with multiple-spindle efficiency because Scully-Jones Quick-Change Chucks make tool changes fast and easy! Operator just lifts locking ring without stopping the machine to release or insert the collet chuck and tool. Unproductive machine time is minimized. Use them with other Scully-Jones tools to speed production, increase accuracy, and reduce operator fatigue on your single-spindle sequence drilling, reaming, and tapping jobs. Write for Bulletin 3-50.



SCULLY-JONES AND COMPANY, 1902 S. ROCKWELL ST., CHICAGO 8, ILL.

SCULLY-JONES

"Precision Holding" for holding precision

Call your Scully-Jones representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for information and service.

IT'S NEW!

MILLERS FALLS PORTABLE SHEAR

Newest addition to MILLERS FALLS famous line of cost-cutting tools for industry

This rugged, high-production tool cuts sheet metal — up to 16 gauge (.060") in steel and galvanized sheet — up to 50% greater in aluminum, copper and other non-ferrous metals. Blade adjustments for different jobs are quickly made — with hex keys conveniently located in tool handle.

In power, in quality, in design, the new No. 16 Portable Electric Shear is an outstanding addition to Millers Falls line of electric tools for production and maintenance . . . including drills, high-speed die grinders, heavy-duty grinders, saws, hammers, sanders, polishers, screw drivers and nut runners.

On straight lines or curves, from inside or outside, Millers Falls new No. 16 Portable Electric Shear cuts clean and fast. Light weight — only 8 lbs. Minimum radius for left hand cuts is ½", for right hand cuts, 1¼". High cutting-line visibility. Precision-ground, heat-treated alloy steel blades are quickly removed for resharpening. Built to Millers Falls quality standards, the No. 16 Portable Electric Shear is the latest star in a notable line of industrial electric tools.

Compare the features

Write for free literature on the new Millers Falls Shear, on Millers Falls complete selection of high-performance, advanced-design electric tools. Demonstrations will be quickly arranged on request.

MILLERS FALLS COMPANY
Dept. AM-6, Greenfield, Mass.

MILLERS FALLS TOOLS
SINCE 1868
The Mark of Superiority

ROUND TABLE *Discussion*

ACCIDENT-PROOF, FOOLPROOF

What measures can, or should, be taken to make workers safety-conscious, once proper equipment has been installed in the plant? Is this management's responsibility, or are workers on their own?

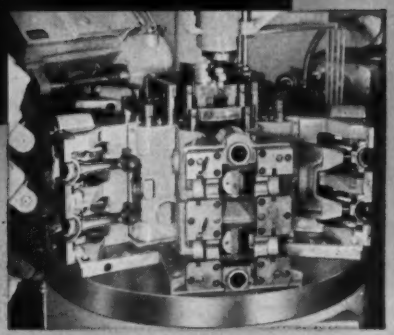
JUST WHO IS RESPONSIBLE for accidents? Isn't it basically the individual worker? Each of us who lives in this world is subject to accidents. Some are self-made, others we seem to be just caught in.

Each company is faced with the problem of safety. Nearly all are at some time called upon to take drastic steps to reduce the accident rate both in severity and in frequency. Now to do this it is necessary to have a good safety program which not only talks but also acts safety. Posters and talks are good, but the program must be carried further. While none of us likes to be told what we must or must not do, when life or limb is at stake we should follow the advisements of the safety engineer who has the details of past experience in other shops as well as his own and in other industries at his command.

Sure, we all say it can't happen to use—we are always careful. But can you be sure of the other fellow? Don't take the chance—be wise and keep alive!

Two of the major accidents which

FOR CONNECTING RODS AND CAPS . . .



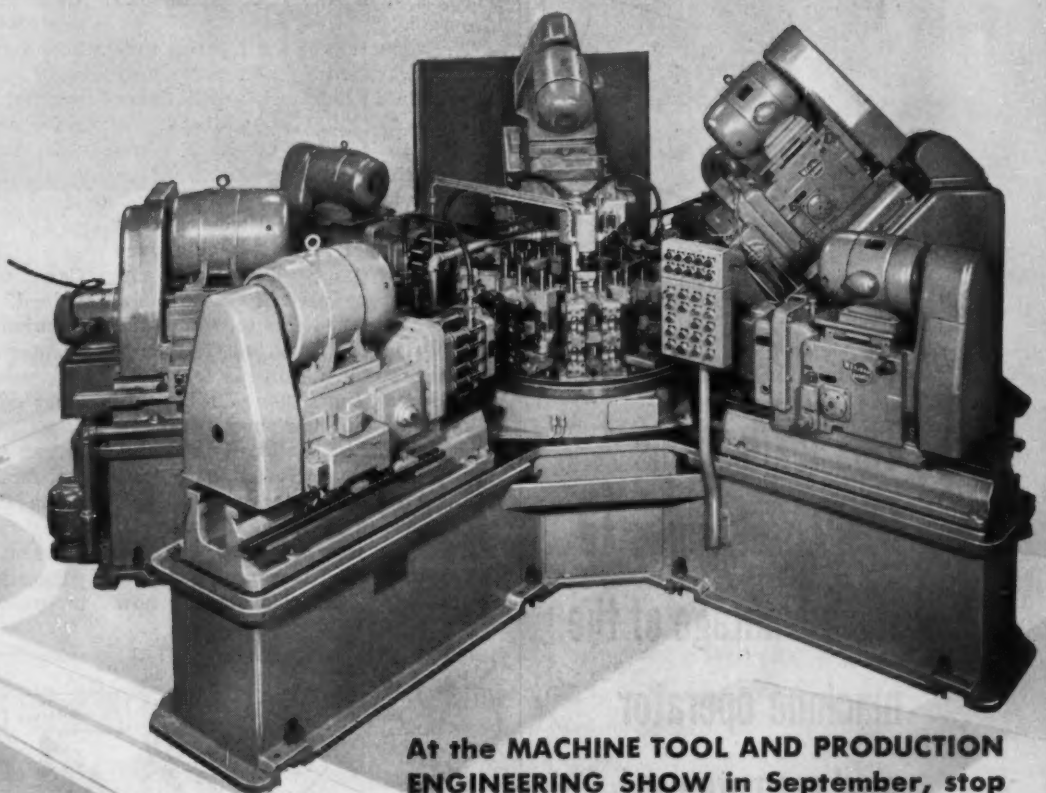
This new type machine drills, redrills, rough-reams and finish-reams the bolt hole; mills the lock slots and burrs them. Available with 4, 6, or 8 stations.

IT IS FLEXIBLE: units are self-contained—they can be used for hundreds of purposes.

IT IS ACCESSIBLE: the wing-type horizontal machine makes it easy for the tool maintenance man.

INDIVIDUAL UNITS FOR REAMING to avoid accelerating the spindles.

This new booklet showing recent KB machine tools will be sent to you on request.



At the MACHINE TOOL AND PRODUCTION ENGINEERING SHOW in September, stop in for a visit at BOOTH 1223.

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KRUEGER-BARNES Corporation

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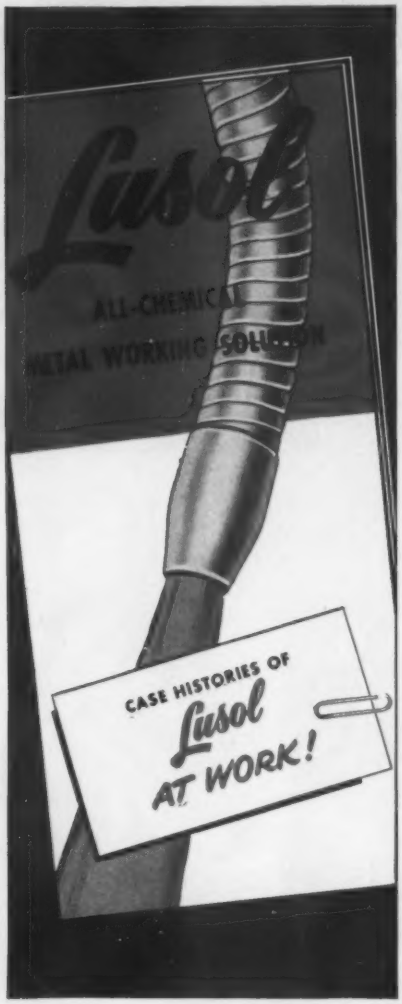

This leaflet tells how Lusol works to the advantage of the machine operator *and* management

FOR A FREE COPY—
MAIL THE COUPON
on the opposite page

take a great toll from our industrial plants are eye and toe injuries. These two types of accidents can be controlled. The use of individually fitted safety glasses is one method employed successfully by many companies. Cost? The cost is far less than the insurance rate which goes up rapidly when a company is not safety-minded. Sure, some workers object to wearing glasses in the plant, but once it is made known that this is company policy and that *not* to wear them means termination, all will go along. It is not a hardship, for, like anything else, one soon becomes accustomed to the procedure. If the rule is made universal throughout the shop and enforced, each worker is protected. Some companies, in order to keep the policy uniform, insist that all office workers and anyone else, visitors included, who enter the plant must wear safety glasses. This helps build up the program.

The reduction of toe injuries may be accomplished by the use of safety shoes. This program is a little more difficult to sell, for while safety glasses are usually provided at no charge, shoes must be purchased by the individual.

Futher, it is sometimes difficult to tell whether the shoes being worn are safety shoes. These problems should not be used as reasons for not using safety shoes to reduce the severity of foot injuries. Naturally if one drops a die on his foot even with safety shoes some injury will take place, but the severity of the accident will be materially reduced. The lost time will often be cut by 80%. All these factors add up to a safer place to work and a lower cost to the company.

The individual worker has a part in this program. No matter how much he dislikes to be regimented, there are certain things we must all do. When programs for safety are in effect we must obey them. We certainly do not want to be maimed for life, and if we do not follow instructions we perhaps will be better off not working for the company which is trying to protect us.

To keep ourselves fit and without loss of eyes or toes, let us endorse the use of safety shoes and safety glasses. Regarding other safety needs, your company has developed regulations and devices in nearly all of the danger spots. Don't try to operate a machine which is not guarded. Demand protection, and see that your foreman follows company policy. Further, make it your business to work and act in a safe manner—your life depends upon it, as do the lives of your fellow-workers.

Each foreman must make it his responsibility to see that his department is safe. Make sure of the housekeeping, the machines, and be constantly alert to danger points which are not covered by the safety program now.

Be alert and stay alive!

Charles D Townsend
West Hartford, Conn

ACCIDENT PRONE

Can accident-prone workers be helped? Is there any cure for their seeming inability to avoid hurting themselves? Is it better to try to shift an individual to a comparatively safer office job?

IF THE ACCIDENT-PRONE are otherwise satisfactory, every effort should be made to retain their services. In many cases they are not hopelessly accident-prone, not incurable. Ed's suggestion about calling in psychiatrists—the name's against them, I'll

"Ingrowing toenail?"

VISIT A PLANT WHERE *Lusol* IS WORKING!

Talk with men on machines in which Lusol is the coolant—men on lathes, milling and contouring machines, grinders, drills, rollformers, cutoff saws. Lusol engineers are doing this all the time, so ask to visit a plant with them.

You'll see an unusually *clean* plant, because there's no oil in Lusol to burn and smoke. Machine cleaning programs built around Lusol make factories better, healthier places to work. Workmen like Lusol because it's easy on the hands and their clothes stay cleaner.

Because Lusol is an all-chemical water solution, it dissipates heat faster. You'll see machines working at higher speeds, producing more and better parts. Less downtime for changing tools, since cutting edges run cooler and stay sharp longer.

WITH THIS EVIDENCE

Ask for a trial of Lusol in your own plant—not a special run in just one machine, but on standard jobs on a variety of machining operations. The Lusol man will help you clean out the machines, install Lusol in proper concentrations and get the tests under way.

This coupon will bring you a free copy of the booklet telling how Lusol All-Chemical Coolant is being used on various operations throughout the metalworking industry. Check, too, if you want an engineer to call about a test of Lusol.

FOR FREE LITERATURE ON LUSOL, MAIL THIS COUPON

We'll have a Lusol field engineer call and arrange to run the test in your own plant.

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PORTLAND, CONNECTICUT

F. E. Anderson Oil Co., Inc., Box 215, Portland, Connecticut

☐ Send me the leaflet, "Case Histories of Lusol at Work" and any other data.

Name_____ Title_____

Company_____

Address_____

☐ Have your man call to discuss arrangements for installing Lusol All-Chemical Coolant in the machines selected for this test. ( )

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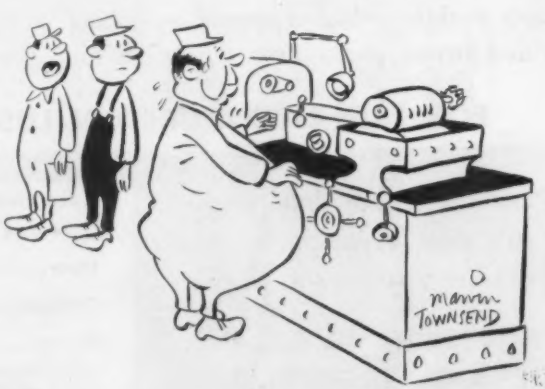
admit—should not be lightly frowned on, nor should any other no matter how remote their chances of success may, at first sight, be. Al is very near to the truth when he says that the really accident-prone are like sufferers from a disease, but, from experience, I am not convinced that the disease is incurable. On the contrary, I am convinced that if not completely curable, it yields to treatment if carefully handled and intelligently observed, and can be largely damped down.

The maggot of accident-proneness is frequently found in abnormal or slightly abnormal people — people who have extremes in their make up, people who fly up on the slightest provocation, and those who are timid and uncertain. I am no great believer in the largely overrated psychiatrist's ability to cure everything pertaining to unbalanced behavior but, in the accident-prone, there would seem to be a wide field awaiting them. I hold those views as the result of an intelligent, patient, tolerant foreman's handling of an accident-prone case. The patient concerned was a capable workman and a very likeable person. After a few months in our employment, the foreman became aware of frequent minor mishaps and had one or two friendly chats with the victim. Over a period, he continued to observe his patient, quietly and unobtrusively, that he might not be made to feel there was anything abnormal about him. During a three-month period of patient observation, the man's high accident rate continued.

Most of his mishaps occurred at his machine and the foreman, as a result of close observation, concluded that the man's natural timidity was affecting his concentration and that his mind was wandering to things other than the job in hand. This sometimes produced work accidentally spoiled—cut fingers, torn clothing, etc. Later, the man confessed that he often looked around to see if the foreman was about. He said "It is just a habit of mine," but his foreman put it down to fear. Why a man of acknowledged ability and good conduct should fear his foreman looking him over once in a while, we never found out. What we did find out was that the man was much in need of more confidence. The foreman and myself were agreed on that after carefully examining all the related data grouped around the case. Our course was set accordingly.

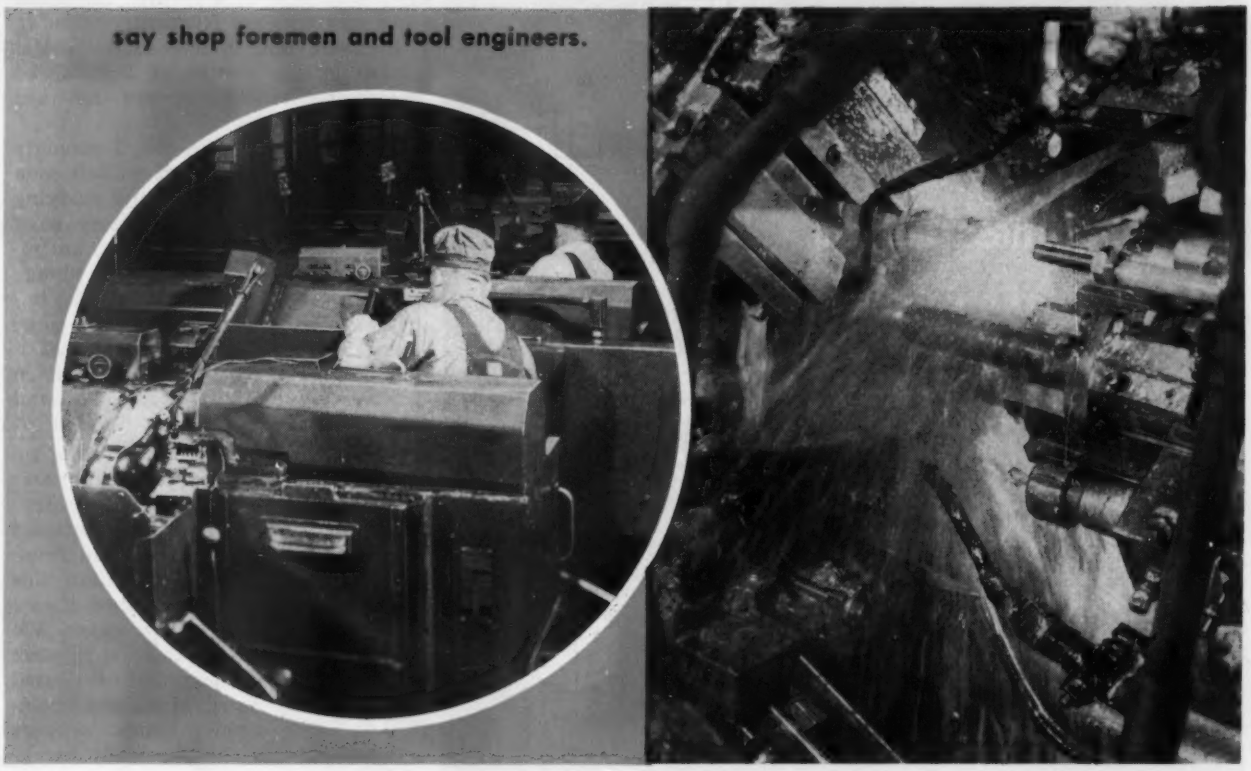
Except for occasional friendly chats when the foreman gave him a pat on the back, sometimes for his punctual timekeeping, sometimes for the quality of his work, the foreman kept out of his way. Slowly, the man seemed to become more buoyant, more sure of himself and, later on, he had fewer minor accidents. We doubt if he was sharply aware of being more confident, but in a vague way he must have had a glimmer of it, for, at a later stage in his convalescence, he confided to his boss "I'm getting on better now." The foreman now thought that straight repetition work might be the man's strong suit, and so it proved. On repeat work, working to a price, he was a very different man. He spread himself more, the extra money he was earning and the knowledge that he *could* earn it, caused his confidence to mount and while he never became accident-free, he eventually became no more prone than average.

In talking over accident-proneness with a factory doctor, he asserted that statistics proved certain types to be addicted, the types being (1) people who, by nature, are clumsy; (2) timid people; and (3) people who are over-confident. He thought the timid and over-confident could, with proper treatment, be weened from their bad habits. He had not much hope for the naturally clumsy ones. Lack of concentration, in his opinion, contributes largely to accident-



"It looks like Swanson has eaten himself out of a job."

"To increase production and tool life on non-ferrous metals, we recommend GULF CUT-AID,"



Here are a few typical examples of the results reported by machine shops since they switched to Gulf Cut-Aid:

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- ". . . proved superior to 12 other cutting oils we tested. We got 10% greater production, 50% longer tool life;"
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- ". . . rejections entirely eliminated, production increased 20%."

Results like these are possible because Gulf Cut-Aid has a high rate of penetration, good "wettability," and excellent cooling properties. It also contains an effective anti-oxidation additive which helps prevent gum and sludge formation in the coolant system. And it will not corrode or stain metals.

In addition Gulf Cut-Aid is an effective energizer for other cutting oils, regardless of type or viscosity. This blending makes possible higher production speeds and results in improved finishes and longer tool life.

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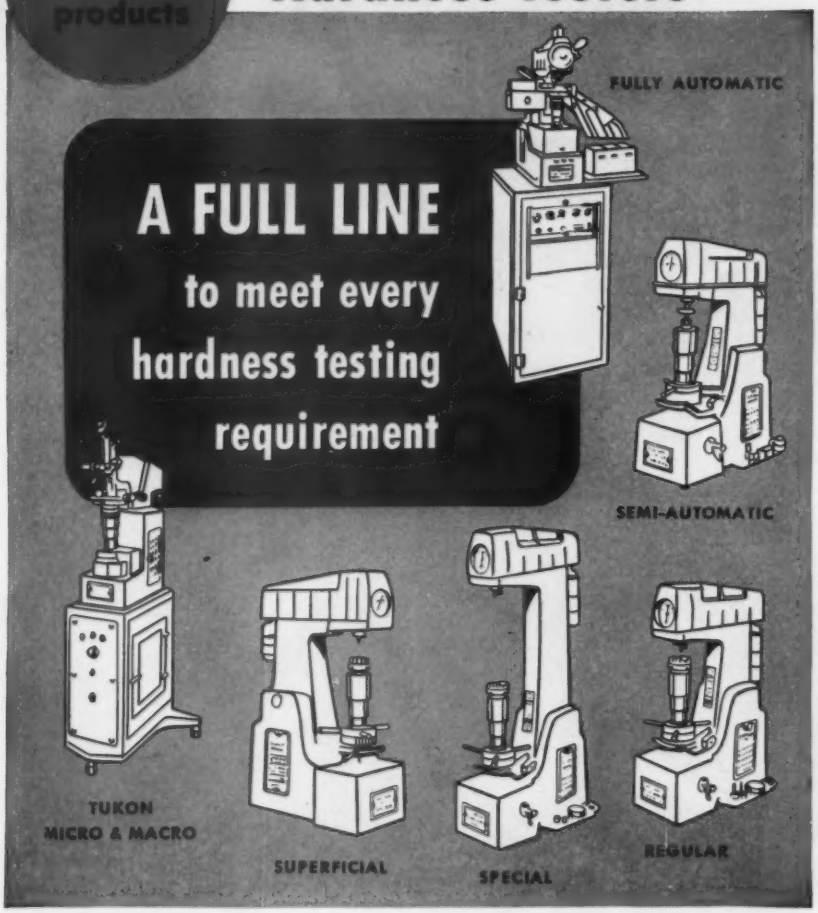

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proneness, and so does over-concentration. Lack of concentration, due to some long and unrelieved worry, has provided its quota of accidental work spoilage and physical injury. Over-concentration due to anxiety to excell, say, in speed of production when operating a machine, can cause the extremist in such matters to be forgetful of his own safety and could involve him in accidents. Examples of men who are frequently prone to accident, due to intense concentration in the matter of high speed machine production, are not unknown.

All things considered, I strongly favor keeping a *good* skilled man who is accident-prone, and studying him carefully for ways and means of effecting a cure or, at least, an improvement. If one is prepared to take the necessary care and trouble, improvement should not be impossible in, perhaps, the majority of cases.

C D Mackinnon
Glasgow, Scotland

THERE IS A SURE WAY to cure the accident-prone employee. Several years ago as an active member of a safety committee we established a national record for machine shop and foundry. We were able to attain this record by an unusual method of curing the accident-prone workers. We elected them one of the first to serve on the safety committee. We used the rotating system of selecting members. The accident-prone workers together with the physically handicapped were the first chosen for a term of six months. At the end of their term we had no more accidents from the former accident-prone employees.

We made safety a part of everyday business. Good housekeeping, machine hazards, fire protection, posters, and other visual training aids

"Which one of you fellows is Tex?"

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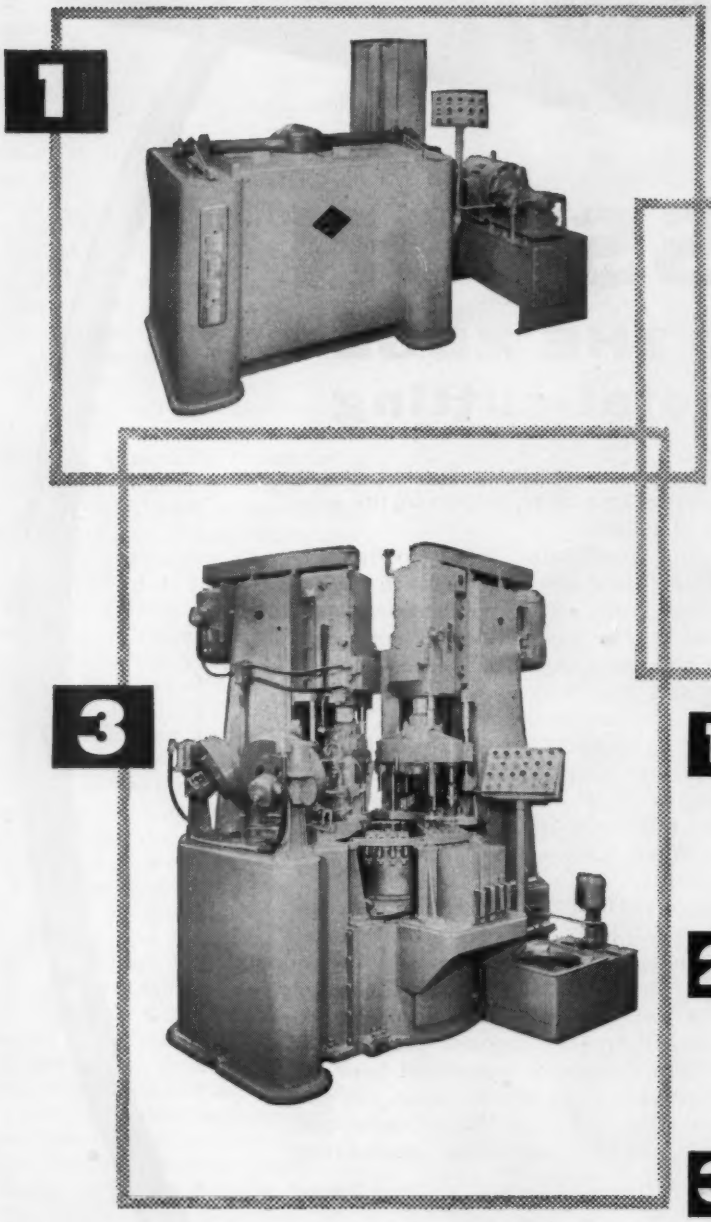

1 IMPCO Backchamfering Machine

Backchamfers 10 carrier bolt holes on inner back flange face of automobile rear axle housing at the rate of 280 PCS PER HR.

Axle housing is transferred to the machining station, backchamfering tools automatically swivel in position to chamfer the holes, retract and return to starting position. Part unloads automatically.

2 IMPCO Polishing and Wire-Brushing Machine

Automatically polishes bearing diameter, deburrs shoulder, and automatically wire brushes oil grooves of automobile transmission shaft at rate of 720 PCS PER HR.

Completely automatic. Spindle runs *continuously*. Abrasive cloth automatically indexes for each operation.

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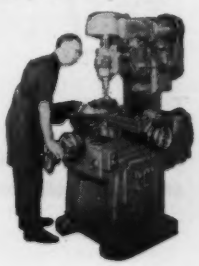

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were used. Protective equipment such as safety goggles, helmets, leggings, gloves, and various type aprons were also used. Motion pictures and trips through the plant to spot possible hazards were a big help in making the whole plant safety conscious. Safety was a part of each new employee's training.

My suggestion to cure the accident-prone worker is to let him serve on the safety committee.

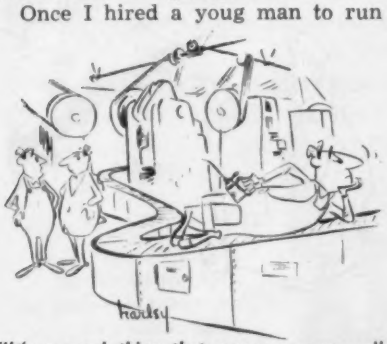
A E Salmons
Philadelphia, Pa

THERE ARE PROBABLY MANY REASONS why some people become accident-prone. They may have mental or physical defects not visible to the casual observer; they may be periodically sick; some members of the family may be ill so that the mind of the husband is affected; economic or other reasons may play their parts. Of course, some are clumsy or awkward and get into trouble, and others are too daring.

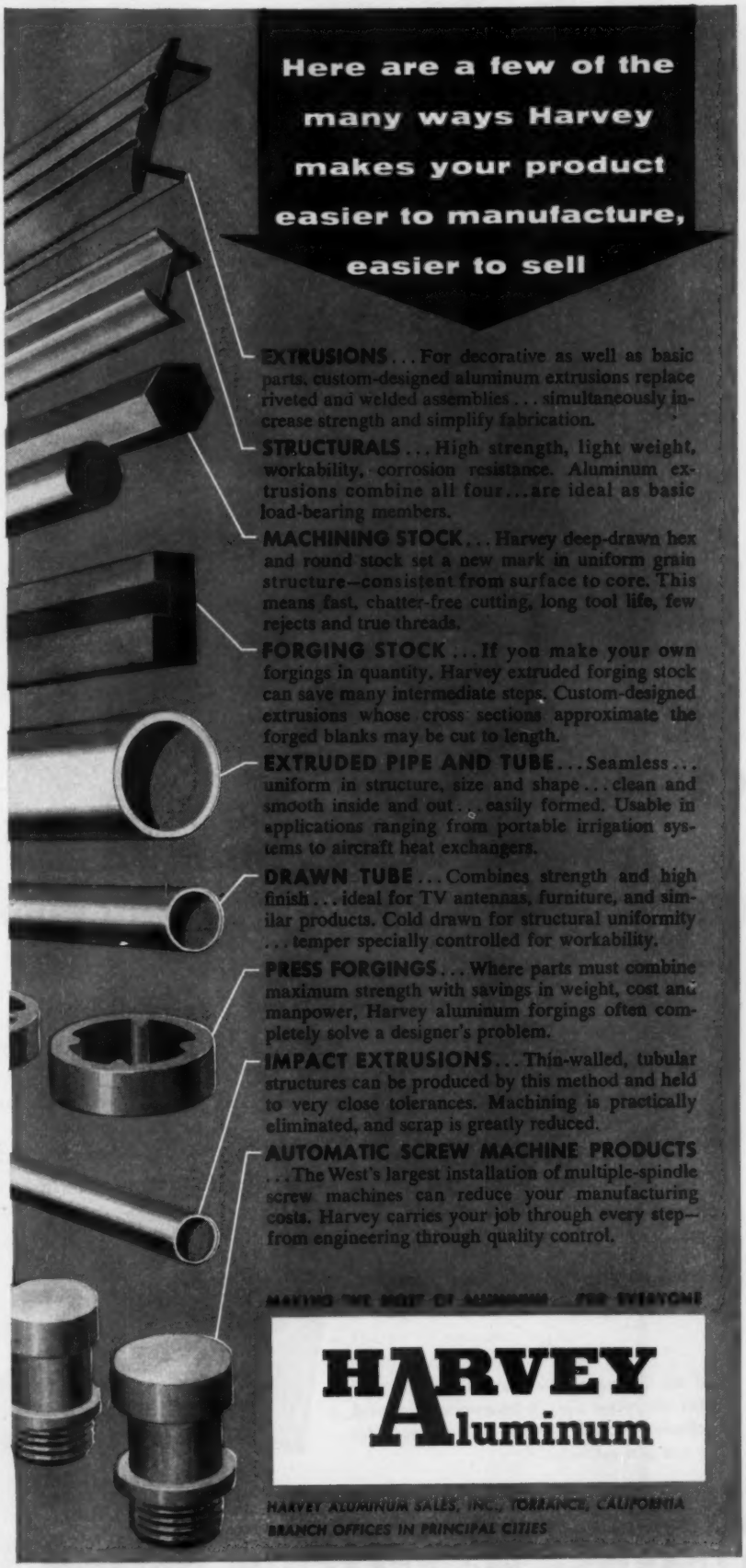
While I worked in Boston as a machinist I witnessed many accidents. Right in front of me on the third floor a gang of men were busy cleaning the windows. One of the men stepped up on the window sill, opened the window and crawled outside, holding himself only by the upper half of the window. It gave way and he plunged to the street. The man died. After the accident the gang's foreman said that he had long expected this to happen, and he had warned him several times to take no chances as he had previously suffered several minor accidents.

At the same place the president of the company died in an accident too. He had lost economic control of his company and was walking in a haze all the time. He ran into some accident every day while inspecting the shop. One day he intended to take the freight elevator on the second floor to go down to the first. There were no safety arrangements on the elevator (this happened many years ago) and he stepped right out in the shaft and plunged to death.

Once I hired a youg man to run



"It's a good thing that conveyor passes all the machines or Joe would have to get up."


Here are a few of the many ways Harvey makes your product easier to manufacture, easier to sell
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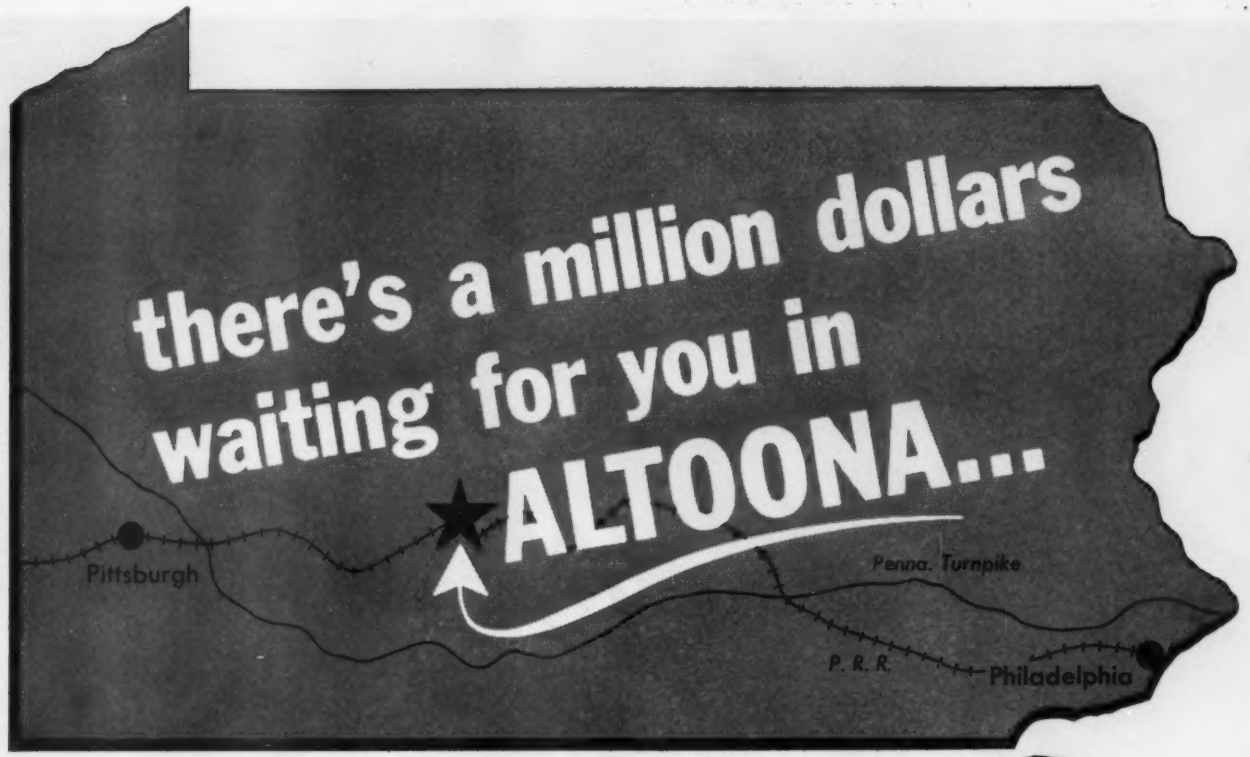
a power press. He hurt himself several times, although not seriously, and as each case was investigated I discovered that he didn't do the work the way he was told to. I was about to take him away from the press. But before the decision had time to go into effect he cut off two of his right-hand fingers. The reason was that he had found he could work faster if he pressed down the two-hand release first and then put the workpiece in the die. His instruction was, of course, to feed the die first and then press the release. The fellow was transferred to a job where he could not get hurt.

Another time I hired a lad, about 18, to run a small steel sheet shear. His behavior roused my suspicion. At that time we didn't send anybody to the doctor prior to employment unless there was some special reason for doing so. The first day he pinched a finger, but that our nurse took care of. The next day a man in the shop whom I told to observe him reported that there must be something wrong with him, so I sent him to the doctor who revealed that the boy was almost totally blind. Then I put him on an assembly job where he couldn't possibly hurt himself.

Any man who shows himself to be accident-prone should be given jobs in which he cannot get hurt. An office job might well be recommended if he is capable of a white-collar job, but there are as a rule many jobs in any shop that are foolproof as far as accidents are concerned, and they should be reserved for workers of this type.

I am not so pessimistic as Ed regarding George Hays or other accident-prone guys. I think there are ways and means to prevent accidents even for them. They can be educated to be more careful, and tools should be as far as possible totally enclosed.

"Zowie!"



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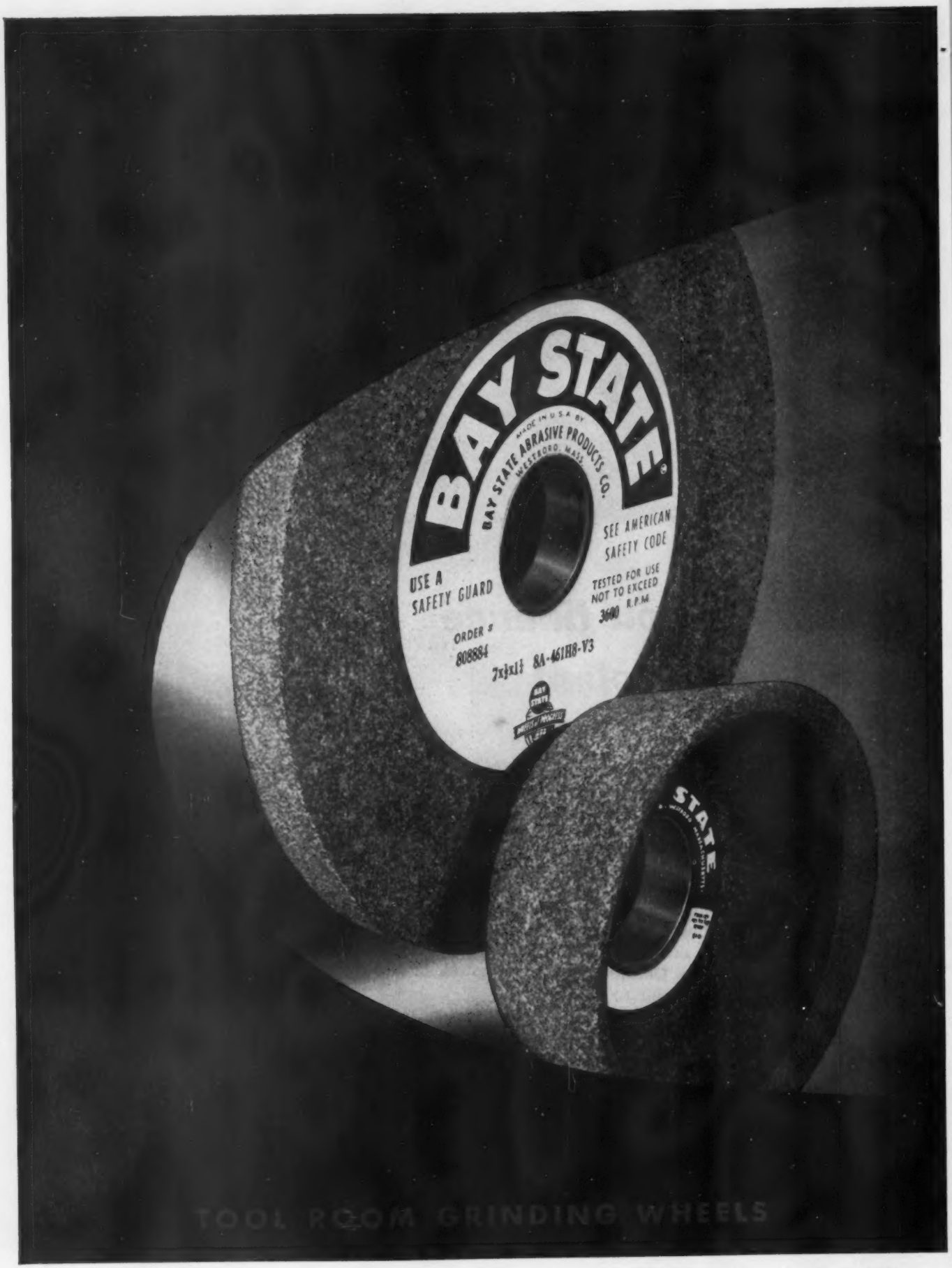
ALTOONA Chamber of Commerce
Altoona, Pennsylvania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Top Tool Conditioning

WITH BAY STATE WHEELS!

Quality cutting tools boost production and cut costs *only* if they are kept in quality condition! For single point tools or complicated cutters . . . steel or carbide . . . there is a BAY STATE wheel to keep quality high and cutting performance at peak efficiency.

Ask your BAY STATE distributor about tool grinding "Wheels of Progress" that keep pace with the rapid progress of modern tools.

SEND FOR LATEST LITERATURE WITH PROVEN SPECIFICATIONS

Here are top tool-conditioning specifications in "Wheels of Progress" . . . well over 150 of them . . each thoroughly proven by industrial use. Send for your copy now.

These specifications and BAY STATE's "On-The-Job" engineering service are an ideal combination for your progress in Tool Room grinding.

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BAY STATE ABRASIVE PRODUCTS CO., Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses—Bristol, Conn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Pittsburgh, Pa.
Distributors — All principal cities
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ANOTHER EXAMPLE of
REDUCING COSTS WITH—

STAINLESS fasteners in STOCK

All types and sizes of screws (Phillips, slotted, hex head, socket), bolts, nuts, washers, rivets, keys and pins

WRITE FOR FREE COPY OF CATALOG P1

- Over 9000 items in stock means *immediate delivery* from one source
- New Garden City plant now operating at top speed and quality
- Unsurpassed facilities for quantity fabrication of specials
- A staff of seasoned engineers always available for consultation
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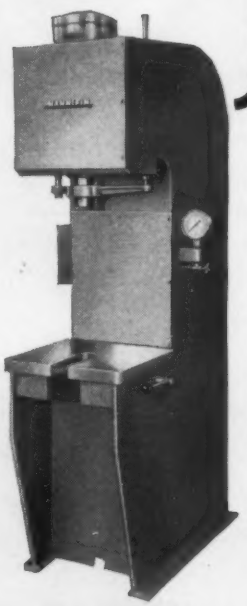
PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 517 S. WOLF ROAD, DES PLAINES, ILLINOIS

Bawling anybody out to prevent accidents is a wrong method; a man-to-man talk will do much more.

Al is going to extremes, and jokes when he suggests that Hays may hit himself in the head against a desk in the office. No man, however accident-prone he may be, would do that. This is an issue too serious to joke about. Millions of dollars are lost every day all over the world through accidents, so I recommend to Ed and Al to study every accident and take steps to prevent them.

To refer any accident to the Personnel Department won't prevent them. They know nothing about these problems and should not be troubled with it. The only thing they can do is to transfer accident-prone people to other departments, but that will not cure this trouble. The foremen in the shop can take care of such men better than anybody else in any organization.

The question of unloading a man because he is accident-prone probably involves the type of production that is being turned out. No such man could be used in a steel mill, for instance, or in a stamping shop. But in mechanical work, light assembly jobs are less apt to cause accidents than heavy machine or construction work. This question must be answered in each case by itself. If any accident-prone man is found in a shop somebody should be sent to his home to find out the circumstances under which he lives before any drastic action is taken against him.

A E Fristedt
Stockholm-Bromma, Sweden

ACCIDENT-PRONE PEOPLE are born with an inferiority complex, which not only causes damage to others but to the man himself in a myriad of ways.

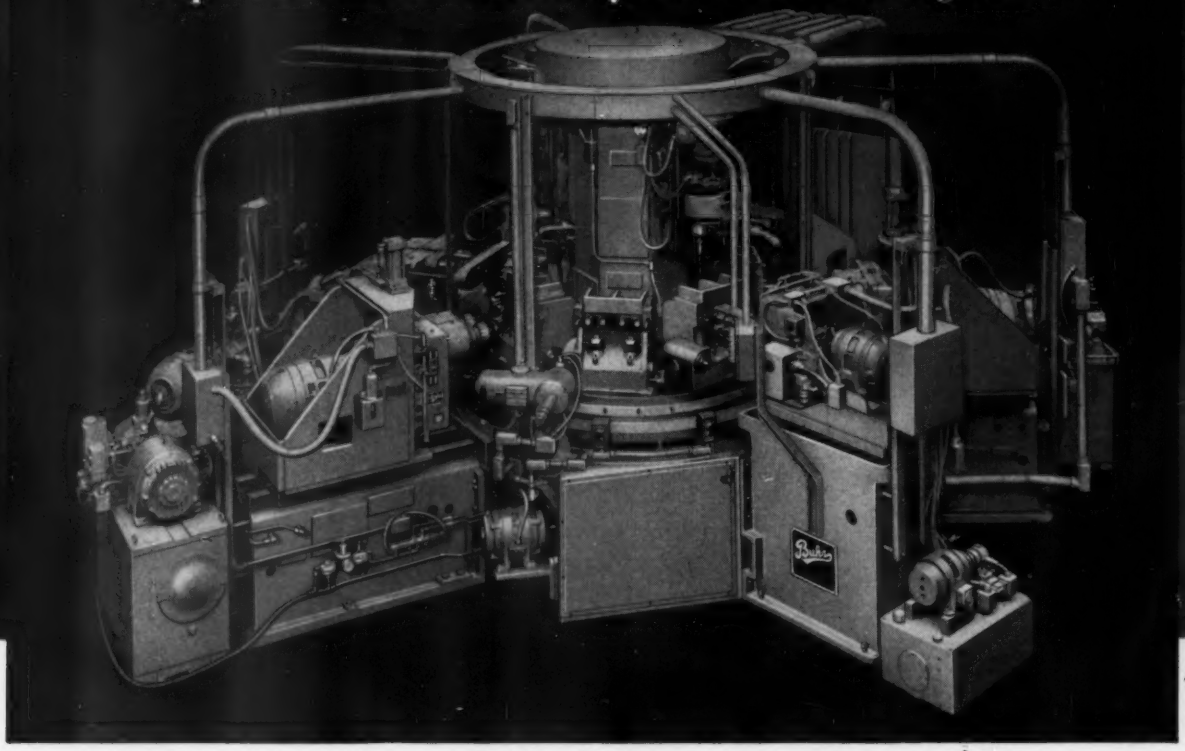
Nearly every large manufacturing plant has one or more of these characters, and a lecture by a foreman

"Listen! It's playing our song!"

ANOTHER EXAMPLE of
REDUCING COSTS WITH—

Buhr ECONOMATION

Mills, core-drills, drills, semi-finish bores, chamfers and taps 288 master-brake cylinders an hour gross!



Rough castings are loaded in pairs in this 10-way 7-station hydraulic-feed center-column Machine.

Equipped with 72"-diameter 7-position automatic power-driven heavy-duty index table, complete with two shot bolts.

For extreme ease of servicing and maintenance, automatic indexing unit slides out *without removing table.* This is done simply by detaching cover on front of Machine.

Other features of Machine include automatic hold-down clamp at rough-and-finish milling station, automatic rotating chip conveyor, power clamping and automatic lubrication.

Buhr
MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

Let us show you how Buhr Economation can reduce your production costs. A phone call, wire or letter will bring you a prompt consultation with one of our top sales executives.

BUHR MACHINE TOOL CO. ©
ANN ARBOR, MICHIGAN

Solidly Engineered • Precision Built • for World's Leading Manufacturers

McCASKEY TOOL CONTROL *pays for itself several times a year....* IN A SMALL SHOP, TOO

The many improvements and savings resulting from complete control of tools in the small plant of Lawler Automatic Controls, Inc., Mt. Vernon, N.Y. are described by James Lawler, Jr., Vice-President, in a recent article.

Manufacture of Lawler thermostatic control valves requires a wide variety of standard and special tools for their 35 to 40 production employees. Production delays from missing tools formerly were frequent and tool expense was high.

Here are a few of the results secured with their simple McCaskey Tool Crib Control system, quoted from Mr.Lawler's statements:

. . . tool crib service is much faster.

. . . quick location of tools on production floor or in the crib saves an average of two hours a day of a machine operator's time.

. . . faster crib service saves many hours of machine down-time.

. . . time required by crib attendant to check tools in and out reduced 70 to 75%.

. . . tool costs have been reduced from 35 to 50%.

. . . breakage records make employees more careful about tool use and abuse and provide for quick replacement of damaged tools.

. . . guesswork has been taken out of ordering and stocking tools through simple and accurate inventory and activity records.

. . . tool hoarding and loss have been reduced, disputes between crib attendant and machine operators are prevented.

. . . the installation paid for itself several times over the first year and continues to be a profitable investment.

Let us send you Mr. Lawler's article and complete facts on McCaskey Tool Crib Control showing how you can have similar results in your plant, large or small.

Victor Adding Machine Co.
McCASKEY INDUSTRIAL DIVISION
3900 N. Rockwell Street
Chicago 18, Ill.

Please send me the article describing use of McCaskey Tool Control by Lawler Automatic Controls, Inc. and complete facts concerning the McCaskey system.

Name .....

Position .....

Company .....

Address .....

AM 3-28-55

McCaskey
INDUSTRIAL CONTROLS
TOOLS - PRODUCTION - COSTS
MAINTENANCE - INVENTORY
Victor Adding Machine Co.,
McCASKEY INDUSTRIAL DIVISION
3900 N. Rockwell Street, Chicago 18, Ill.
Galt, Ontario, Canada

does no good for such a trait is a part of a man's intellect and cannot be in the least overcome by any usual procedure.

One of the pleasantest men working in a large shop was one of these. He was a first-class millwright, and, of course, was upon maintenance work so from time to time he was called upon to enter practically all production departments when it was necessary to set up machines, make repairs, etc.

One day in the carpenter shop he cut off the end of a finger in a bandsaw; less than a month later, he slipped on a short piece of 1-in. round diameter steel and fell down several steps of a flight of steel stairs; result, a sprained ankle. While working on a light industrial locomotive, he sat on the popvalve and it nearly blew his pants off; so it went with no let-up until he had been in a hospital so much that he had become a problem and prospective invalid.

The plant engineer said that he had one course open, and when he explained it he was awarded the horse laugh, but he stuck to his guns and put it in operation.

Smith was put on safety work, for the plant engineer had an idea that a bit of psychology would be good for him.

Smith built guards for belts, gears, saws, etc; made up assemblies of machine attachments and gadgets and mounted them on machines. Many of his own ideas were the means of stepping up production.

It seems that the plant engineer thought that if the theme of safety was constantly brought before Smith's mind, it would cure him, and it worked. For the next three years Smith had no more trouble. Then it was all over. He died.

F H Stebbins
Worcester, NY

"Now remember, turn on the glamor tonight! I invited the boss home for dinner!"

Announcing...

Axelson announces the purchase of the Fray Line of Milling Machines and Milling Attachments which have been manufactured by the Fray Machine Tool Company, Burbank, California, for the past 14 years.

The milling machines and attachments are now being manufactured in the same plant that has built the world famous Axelson Heavy Duty Lathes, Precision Tool Room Lathes, and Special Machine Tools since 1915. The same engineering knowledge and skilled craftsmanship that has steadily improved Axelson Lathes will now be used to produce Axelson Milling Machines.

Axelson

Milling Machines

AXELSON MANUFACTURING COMPANY
Division of U.S. Industries, Inc.
6160 So. Boyle Avenue,
Los Angeles 58, Calif.

Authorized dealers in principal industrial centers.

when you use

1881 CAPEWELL

BAND SAW BLADES

Longer band life, fewer set-ups, more efficient production because Capewell Metal Cutting Bands are made from a selected analysis steel, specially processed for metal cutting saws and ***hardened on the toothed edge only.*** Capewell Metal Cutting Bands lend themselves to cut-off jobs, contour or trimming operations. Available for all types of metal cutting.

CHECK THESE OTHER COST-CUTTING CAPEWELL PRODUCTS:
Power Hack Saw Blades, Hand Hack Saw Blades, Ground Flat Tool Steel, Wrenches, Pipe Tools, Machinists' Hammers.

Always Consult your Distributor
- your best source of information
- your best bet for prompt service
- your best friend in an emergency

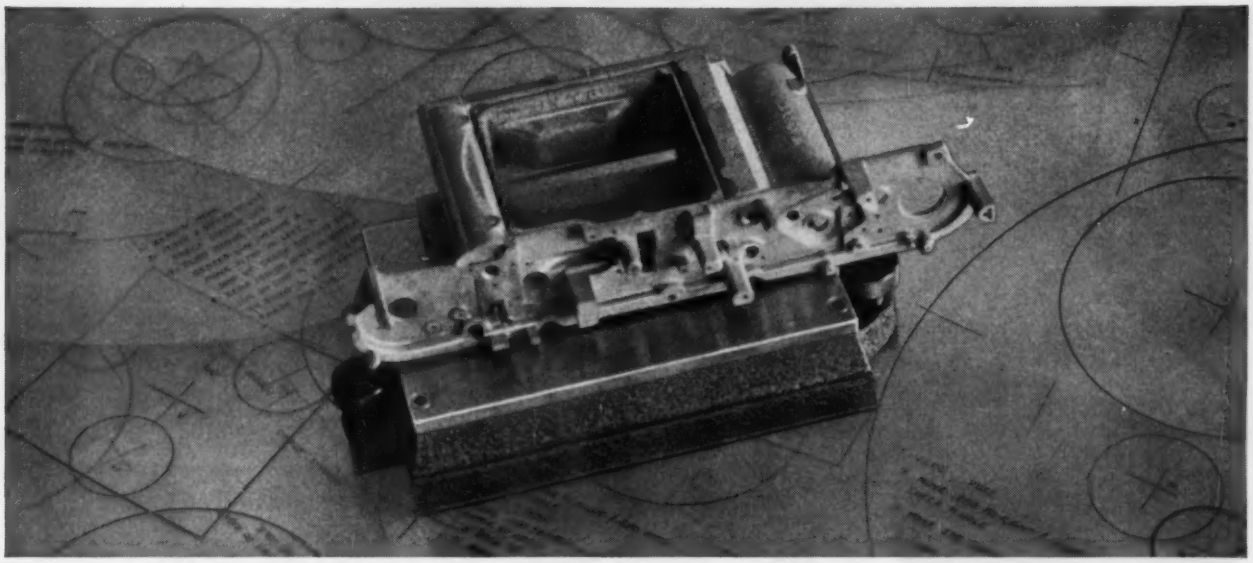
THE CAPEWELL MANUFACTURING COMPANY
65 Governor St., Hartford 2, Conn.
SCA59

TRYING TO CURE AN ACCIDENT-PRONE WORKER of his trouble is hardly within the province of a foreman's duties. If he is unfortunate enough to have such an individual latched on to his group, the best he can do is to let the psychologists in Personnel try to cure him. The troubled waters of accident-proneness require the need for expert delving and knowledge of the underlying causes of this maladjustment which may have psychiartic undertones.

The question of what to do with accident-prone employees can best be answered when this problem is considered as an important part of the safety program of a plant. From my experience in the industrial field, I have found that the older practice in handling this type of employee was simply to release any worker who suffered a serious accident on the theory that he was probably "susceptible" to accidents. The policy today, however, generally proposes to find out why an individual is accident-prone. For example, personal deficiencies in sight or hearing may be responsible. Only if proneness reflects continued violation of safety rules is the employee penalized.

I believe that the control of accident proneness is a matter of personal adjustment of the individual. Management can help in this respect by attempting to reduce personal hazards by fitting people better to their jobs. This involves, first of all, a program of careful selection, placement, and follow-up of employees as they are added to the payroll. It may also involve periodic rotational transfers to and from a task on which there is a health hazard, or the provision of corrective glasses for a near-sighted worker, or shifting an accident-prone machine-tender to a clerical job. Whatever the detailed

"Oh, didn't I tell you? Some of us fellows are taking nose drops to prevent sniffles."



How Graflex, Inc., *cut production costs* with a Kodak Contour Projector

If you've been thinking of optical gaging only in terms of toolroom measurement or final inspection, see what it does when linked to production operations.

GRAFLEX, INC., was producing a complex precision part in which spacing of 40 holes and 12 bosses had to be held to ±.001″.

To solve this tolerance problem, Graflex used a Kodak Contour Projector because: (1) mechanical gages would have been too costly for the required run; (2) optical gaging would be faster; (3) the Kodak Contour Projector gave a quantitative as well as qualitative check.

Here's how this helped cut production costs and speed the work:

Optical gaging made it possible to check parts as they were run, to discover errors before more time and labor were spent on the part; no expensive machining was wasted on parts later found to be out of tolerance. It assisted in assembly operations, too, since the exact condition of the parts was known. And the part could be quickly rechecked at any point during production when a question of tolerance or condition arose.

A Kodak Contour Projector was also used in final inspection—doing in 20 minutes a job estimated at 4¾ hours by surface plate inspection. When the run was completed, the comparator was available for another job.

Perhaps you have production problems that can be solved by fast, accurate, *complete* measurement and inspection. There's a field representative in your area who can evaluate your needs for you. To get in touch with him, or for a copy of the illustrated booklet "Kodak Contour Projectors," mail the coupon below.

Graflex, Inc., used a Kodak Contour Projector, Model 2A, for this operation. The Model 2A is completely equipped for precision micrometry. In addition, it has a magnification selector, built-in surface illuminator, and permits the staging of parts in any plane. As with all Kodak Contour Projectors, it requires no hood.

the KODAK CONTOUR PROJECTOR

90

EASTMAN KODAK COMPANY
Special Products Sales Division, Rochester 4, N. Y.

☐ Please send me a copy of your booklet "The Kodak Contour Projectors."
☐ Put me in touch with your representative.

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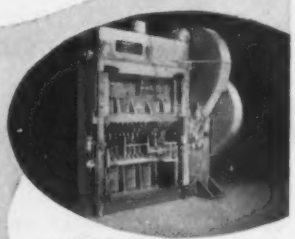
CITY_____ STATE_____
(Zone)

Kodak
TRADE-MARK

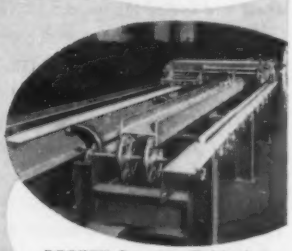
This Beatty Punch CUT COSTS 75%

for a structural steel fabricator

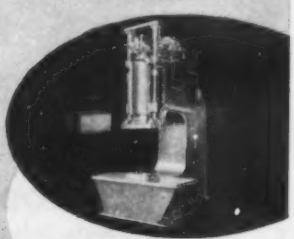
One of our present-day satisfied customers formerly employed machinery using only one punch for punching structural steel shapes. After consulting a BEATTY engineer, this firm installed a BEATTY Guillotine Beam Punch with an adjustable tooling feature that enables them to perform exact repeats of multiple punch patterns in 25% of the time formerly required. Naturally, we can't guarantee such substantial savings in every industrial installation of BEATTY machines! But, if you're currently considering additional production machinery for your metal fabricating plant, better see a BEATTY engineer before making any final decisions! Chances are he'll have an idea or two on how you can achieve greater production economies with BEATTY Machines!



BEATTY Guillotine Beam Punches are available for punching webs and flanges in "I" beams from 6" to 30".

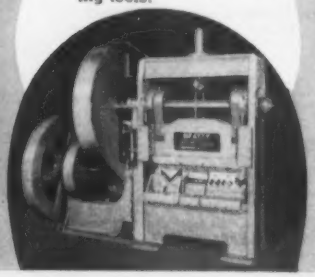


BEATTY Spacing Table handles web and flange punching without roll adjustment.



BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

BEATTY
Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.



BEATTY
Machine & Mfg. Company
HAMMOND, INDIANA

action, its fundamental purpose is to place the worker where he is less of a hazard than before. It is not disciplinary in nature, and all concerned should so understand.

Everyone knows that accidents will happen. Of course we have been fighting accidents for more than a generation. We've made our shops and plants safer. We've passed laws against fire hazards, and hundreds of other injury hazards. But there are a goodly number of individuals who are accident-prone. They seem to follow a pattern of behavior different from the rest of us. The safety devices and rules that protect ordinary individuals do these folks little good. They seem to court accidents. Physical factors, though important as a cause of accidents, do not seem to play the dominant role in accident-prone individuals. More important in accident-proneness is emotional makeup.

Here is a description of the typical accident-prone adult: He is decisive or even impulsive; he concentrates on immediate satisfactions. He is apt to act on the spur of the moment. He likes excitement. The accident-prone person is essentially a rebel; he cannot tolerate even self-discipline. He rebels not only against external authorities, but against the rule of his own reason and self-control. He tends to be aggressive. He finds it difficult to take defeat without becoming argumentive. He likes to have things run his own way. When frustrated or thwarted or subjected to emotional strain, the accident-prone individual becomes rebellious. His resentment may be shown by bringing harm to himself or others.

In my opinion, the solution of the accident-proneness problem would seem to lie in persistent safety teaching of this type of individual. Safety teaching is not useless. It has proved its usefulness in protecting most individuals from true accidents. The accident-prone could be taught to avoid attitudes that encourage lack

POP'S School of Filing

"Whaddya want to know about files and filing? Ask Pop —that's me"

"POP the Foreman" is the likeable yet serious-minded imaginative character who for many years has been a "spokesman" for Nicholson through the pages of this and other leading industrial magazines.

"Pop" speaks the conscientious industrial foreman's language on the use, care and selection of files. And being deeply interested in the success of those who employ men like himself, he has a lot of sage thoughts and suggestions that will prove helpful to efficiency- and economy-minded industrial managements.

So the following three pages are turned over to "Pop," who does some interesting "ghost writing" under our sponsorship and supervision.

Nicholson believes in and has for 40 years adhered to the principle of selling to Industrial Users only through Industrial Distributors. As a result, these Distributors and their field men learn how to WORK FOR YOU. They become experts on files and filing—right down into your shop where the right use of THE RIGHT FILE FOR THE JOB counts in the way you want it to count. There are in the U.S. more than 875 near-at-hand Industrial Distributors of Nicholson and Black Diamond files.

REPRINTS of this instructive 4-page advertisement may be had for the asking. How many copies? Write to Nicholson.

3 MORE PAGES

NICHOLSON FILE COMPANY

NICHOLSON U. S. A.

PROVIDENCE 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ont.)

BLACK DIAMOND MADE IN U.S.A.

FILING SOFT METALS

FAST FILING. Pop says: "Take aluminum, a soft, ductile and malleable metal. It is difficult to file with ordinary files because their teeth soon become clogged. For cutting aluminum rapidly, yet leaving a good finish, the Nicholson or Black Diamond Aluminum 'Type A' file is a recent development for: (1) filing the roughness from aluminum castings; (2) filing sheet and bar aluminum; (3) filing aluminum alloys.

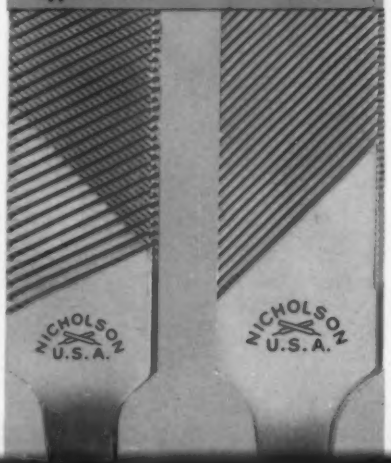
"The upcut of this file is deep with an 'open-throat'; the overcut fine, producing small scallops on the upcut to break up filings, allow file to clear itself, overcome chatter and prevent taking too large a bite.

"Aluminum 'Type A' file is shown below at left."

SMOOTH FINISHING. Pop says: "For soft metals like aluminum, brass, copper, and even plastics, hard rubber and wood —there is a special Nicholson or Black Diamond file called the Shear Tooth which combines fast material removal with excellent finishing qualities. The combination of coarse single cut and long teeth angle of this file provides a smooth shearing action; also minimizes clogging.

"To overcome this file's tendency to run toward the left, it should be used with a somewhat diagonal stroke toward the right. The Shear Tooth is shown below at the right."

Aluminum "Type A" File — *Shear Tooth File*



LATHE FILING

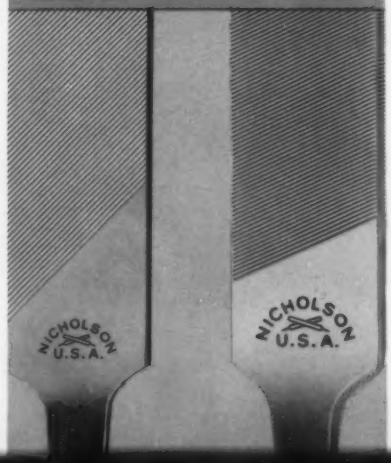
Pop says: "While the ordinary Mill file is normally capable of doing good lathe-filing work, there is a special Nicholson or Black Diamond Long Angle Lathe file with teeth cut at a much longer angle. It provides cleaner shearing and self-clearing; eliminates drag or tear; overcomes 'chatter'; reduces clogging. It is very fast-cutting and produces a fine silken-smooth finish. Its 'safe' (uncut) edges protect any work-shoulders not to be filed.

"Lathe filing is most commonly employed for shaft fitting. High spindle speed should be used; and where stock to be removed is considerable the 12" or 14" size is preferable. For an extra-fine, highly polished finish a Nicholson X.F. Swiss Pattern Hand or Pillar file in No. 4 or No. 6 cut may be used with very good results.

"In using the Long Angle Lathe file, care should be taken at shaft ends and shoulders, as this fast-cutting file may easily cut too deeply at such points. It is also important never to run the hand over the work in the lathe, as accumulated oil and moisture will sometimes coat the work and make it difficult for the file to take hold again.

"In lathe-filing work that is oval, elliptical or irregularly rounded, the finer or lighter cutting Nicholson X.F. Swiss Pattern files will be found most satisfactory. They are made in a wide range of shapes, sizes and cuts. Long Angle Lathe file (left) is shown below in contrast with ordinary Mill file (right)."

Long Angle Lathe File — *Mill File*



PRECISION FILING

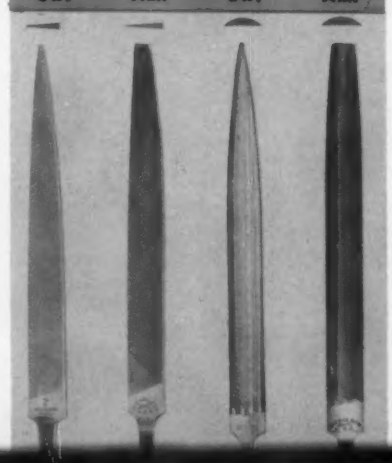
Pop says: "Die and pattern making, model building, precision-instrument making and repairing have gained tremendous impetus in aircraft, automotive, engine, machine-tool and other rapidly expanding industries. All these—to say nothing of the long-established watch, clock, jewelry and kindred industries—require precision files of innumerable shapes, cuts, sizes and purposes.

"While for many kinds of work regular files are all that are required, Swiss Pattern files—made to very exacting measurements and finer cuts—are necessary for the more particular purposes mentioned above.

"In precision filing all the elementary rules for general filing apply. The flat precision files should be used with a slow, smooth action, with the forward stroke moving the file laterally along the work. In using the round or half-round types, the file should be turned clockwise as the stroke is made, to assure a deeper cut and a smoother finish.

"There are many instances — in model and fine-instrument making, for example —where intricate fit-filing is necessary on small forms of wood, plastics or other non-metallic materials. Swiss Pattern files are perfectly adequate for such purposes, provided they are used while sharp and kept clean with a file brush. Contrasting views of typical American and Swiss Pattern files are shown below. By the way, Nicholson X.F. (meaning Extra Fine) Swiss Pattern files are the largest line of their kind in the world."

Sw. — *Am.* — *Sw.* — *Am.*



FILING FLAT AND CURVED SURFACES

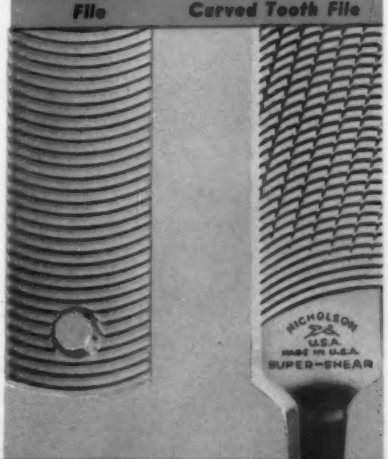
Pop says: "Milled Curved Tooth files cover a distinct filing field and have a considerable range of shape and structural characteristics. Unlike the chisel-cut teeth of regular files, these curved file teeth are *milled* in with a precision that gives them almost 'razor sharpness.'

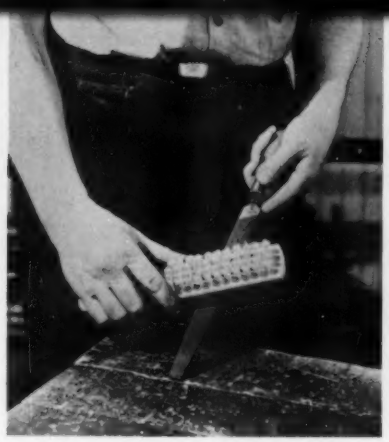
"Curved Tooth files are widely used in the automobile manufacturing and repair industries for work on aluminum and sheet steel (on flat or curved surfaces). They are also used on such soft metals as brass and babbitt, and often on iron and steel in general. Because of their curved teeth they readily clear themselves of chips and have the correct rake for speed and economy.

"Nicholson Superior Curved Tooth files are made in both Rigid and Flexible forms —the Rigid, either tanged for the conventional handle or plain (with hole at each end) for special holders; Flexible, plain only—for use in special holders on concave surfaces. Standard, Fine and Smooth cuts; in parallel Flat, Square, Pillar, Pillar Narrow, Half Round, Shell and Moulding types.

"A special Curved Tooth file is the Super-Shear. Exclusive with Nicholson—its teeth, divided by angular longitudinal serrations, are cut in an 'off-center' arc. This gives them virtually a right angle and wide gullet toward one edge — for fast cutting; also a longer, shearing angle and narrow gullet toward the other edge—for smoothing. Practically two files in one!"

Plain Flexible Curved Tooth File — *Super-Shear—Special Curved Tooth File*





THE CARE OF FILES

Pop says: "File life is greatly shortened by improper care as well as by improper use—and improper selection. Some useful 'Do's' and 'Don'ts' are offered here:

"Files should never be thrown into a drawer or tool box containing other tools or objects. They should never be laid on top of or stacked against each other. Such treatment ruins the cutting edges of their teeth.

"Keep files separate — standing with tangs in a row of holes or hung on a rack by their handles.

"Keep files in a dry place so rust will not corrode their teeth points.

"It is also of great importance to keep files clean of filings or 'chips,' which often collect between the teeth during use. After every few strokes the good mechanic taps the end of the file on the bench to loosen these 'chips.'

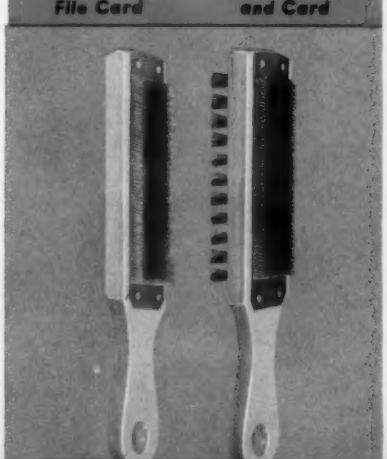
"The filer should also have on hand a file card or brush. With it the teeth of the file should be brushed frequently — and always before putting the file away.

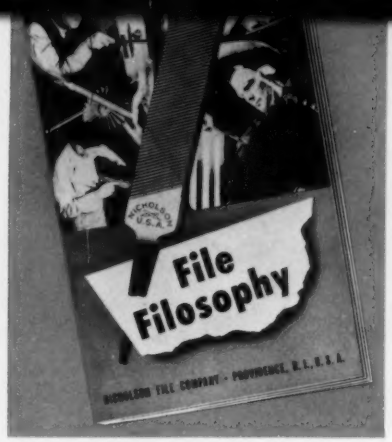
"To remove obstinate 'pinnings' which sometimes clog up the teeth and cause scratches on the work, a 'scorer' made of soft metal is often a further help.

"Oil or grease on files should be removed with chalk.

"File card (left, below) is for more general use. File brush and card (right, below) is used especially on the finer cut files."

File Card — *File Brush and Card*





"FILE FILOSOPHY"— FAMOUS NICHOLSON BOOK ON FILES AND FILING

Pop says: "And the foregoing isn't the half of it! It's just some samples of the things Nicholson's *new 50-page edition* of 'File Filosophy' tells about.

They are also typical of the subjects used by Nicholson technical specialists available for meetings and slide-illustrated lectures through arrangements with Nicholson's Industrial Distributors.

"Further discourses, descriptions and illustrations on files and filing cover such subjects as:

- **A Bit of File History**
- **Important Steps in File Making**
- **File Kinds, Shapes, Cuts and Cross Sections**
- **Mill and Other Types of Saw Files**
- **Machinists' Files**
- **Rasps**
- **File Terminology**
- **More About Special Purpose Files**
- **More About Precision Filing (Swiss Pattern Files)**
- **More About Milled Curved Tooth Files**
- **Hand, Band, Circular, Crosscut and Other Saw Filing**
- **Saw Chain Filing (a new chapter)**
- **Sharpening Tools and Implements**
- **Rotary Files and Burs (a new chapter)**

"Let me send you this 'mechanics' textbook.' Every industrial production head, purchasing agent and tool keeper should have a copy. Just write to 'Pop,' care of Nicholson File Co., 23 Acorn Street, Providence 1, R. I."

NICHOLSON FILE CO.

PROVIDENCE, RHODE ISLAND

(In Canada: Nicholson File Company of Capada Ltd., Port Hope, Ontario)

NICHOLSON U.S.A.

Heavy Filing

USE THE RIGHT FILE FOR THE JOB

Pop says: "Actually there are *thousands* of kinds, cuts and sizes of files. That is because there are thousands of different filing jobs, each of which can be done better by using *the right file for the job.*

"Therein lies the first rule on 'How to get the most out of files.' From the roughest cast-iron filing job (as in the illustration above) to delicate die or fine-instrument finishing (see picture below), the right file enables doing the job properly, whereas the wrong one does not — and often, in fact, ruins the work. The right file saves time because it performs correctly, and usually faster, on the kind of metal or work for which it is designed. The right file permits a greater number of efficient filing strokes — per file and per file cost.

"Many factors enter into the selection of *the right file for the job.* In general, different files are required: (1) to file a flat or convex surface; (2) to file a curved or concave surface; (3) to file an edge; (4) to file a notch, a slot, or a square or round hole.

"But these factors can become complicated by hundreds of combinations with additional factors, such as: (1) the kind of material to be filed; (2) the kind, shape and hardness of the object to be filed; (3) the location, size and character of the surface; (4) the amount of metal to be removed; (5) the degree of smoothness or accuracy required. Therefore, selecting exactly the right file for *any* particular combination is no easy task. Experience is a good guide—but a slow teacher. However, with the aid of 'File Filosophy' (see last panel), no mechanic need be far off the track to *the right file for the job.*"

Precision Filing

Right Filing

USE THE RIGHT *FILING METHOD*, TOO

Pop says: "Filing is an industrial art. Grip, stroke and pressure must 'fit the job,' *and* the kind of file used.

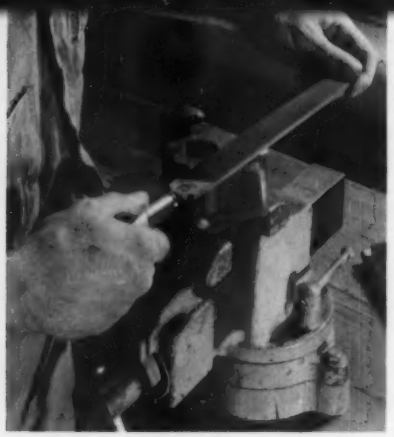
"FILING ACTIONS. (1) *Straight filing* consists of pushing the file lengthwise —straight ahead or slightly diagonally— across the work. (2) *Drawfiling* consists of grasping the file at each end and pushing and drawing it laterally across the work. (3) *Lathe filing* consists of stroking the file against work revolving in a lathe.

"VISE FILING. For general filing, vise should be at about elbow height; somewhat lower for continuous heavy filing; nearer eye level for delicate work. When necessary to prevent vise-pressure marks, a pair of soft-metal 'protectors' should be placed between the vise jaws. For holding and protecting round pieces, grooved hardwood blocks are sometimes used.

"GRASPING AND 'CARRYING' FILE. In most two-hand filing operations, handle grasp should be 'full' with thumb lying parallel along the top. Point of file is usually grasped by the thumb and first two fingers of other hand, with thumb on top and approximately in line with file. For the lighter strokes, thumb and fingers should be moved toward right-angle position according to pressure required.

"To prevent 'rocking' in flat-surface filing, file should be carried forward in almost a straight line—changing its course just enough to prevent 'grooving.' Apply just enough pressure to keep file cutting and prevent 'slide.' On back stroke lift file clear on hard metals; and with only file-weight contact on soft metals."

Wrong Filing



FILING ROUGH CASTINGS

Pop says: "Snagging castings—removing fins, sprues, and other projections—is very rough work and mighty tough on ordinary files. Their teeth are designed for sharp, fast cutting and therefore do not possess the ruggedness to withstand the shock when driven under pressure against hard projections or sharp edges. Filing of this sort engages only a few teeth at one time, thus putting a severe strain on each.

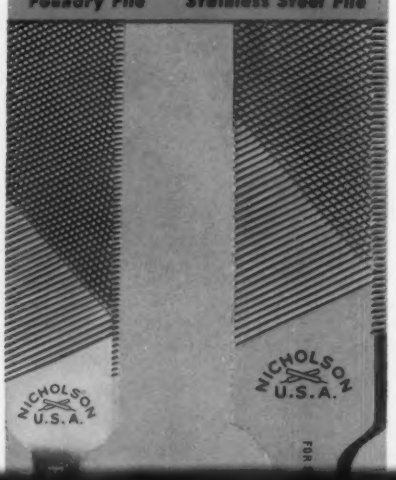
"So, for such work it is best to use a special Nicholson or Black Diamond Foundry file whose teeth are sturdier and have heavy-set edges—to resist shelling or breaking out. While not expected to possess the cutting speed of ordinary files, Foundry files have much longer efficient life on the kind of filing for which they are designed. (Foundry files are also widely used for filing sharp corners of dies.)"

FILING STAINLESS STEEL

Pop says: "The tremendous increase in the use of stainless steel and similar alloy steels has created a new and distinct filing problem. The hard chromium and nickel content of these steels makes them extremely tough and dense. This causes them to have an abrasive action that tends to shorten the life of the general purpose file.

"Nicholson research has overcome this problem with a special file for such steels. It has exceptional wearing qualities. Properly used with light pressure and a slow, steady stroke, this new file removes metal rapidly, requires but little effort and leaves a good finish."

Foundry File *Stainless Steel File*



FINANCIAL AID TO HIGHER EDUCATION

Our Colleges and Universities Are Living on Borrowed Time

. . . time borrowed from underpaid faculty members

The chart on this page tells a story of profound importance to every American. It is the story of the financial beating our college and university faculty members have been taking in the past 14 war and postwar years.

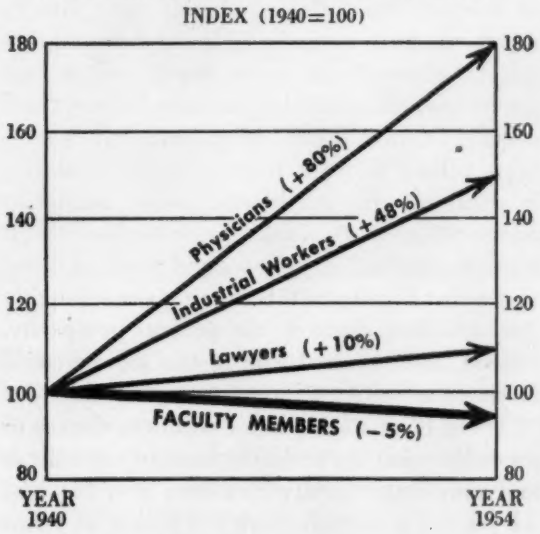
On the whole, this span of 14 years has been one of great and growing prosperity. But, as the chart shows, our college and university faculty members have, as a group, had less than no share in it.

During this period, from 1940 through 1954, the real income of the average industrial worker (that is, what his wages would purchase in goods and services) has increased by almost one-half. Among professional groups, physicians have enjoyed an increase of about 80 per cent in their real income. Lawyers, far less favored financially, have had an increase of about 10 per cent. But faculty members have not only had no increase at all; over these years of prosperity their average real income has fallen by 5 per cent. These figures do not take account of the increase in taxes since 1940.

Senior Teachers Hardest Hit

These figures are, of course, averages. For some groups of faculty members it has been better; for others worse. It has been particularly hard on senior faculty members. Between 1941 and 1953 their salaries lost about 8 per cent of their purchasing power. Being deeply committed to their careers they could not respond to alternative employment opportunities as readily as could their junior colleagues. For junior faculty members there was some increase in real income between 1941 and 1953 but only about half as much as the average for the nation.

What's Happened to College Faculty Salaries*



* Real Income before Taxes.

Source: Council for Financial Aid to Education; U. S. Dep't of Commerce; U. S. Dep't of Labor.

Public Colleges Fare Better

There are also marked differences in the average financial reward received by faculty members in different types of colleges and universities. A recent study by the Council for Financial Aid to Education indicates that, in the last academic year, 1953-1954, teachers in privately endowed, independent colleges and universities were paid an average salary about $1000 less than that paid to faculty members in tax-supported institutions. The same study indicates that salaries far below the average are especially common for faculty members in the small private liberal arts colleges. This study found that during the last academic year the average salary of all college and university faculty members was about $4700.

The special difficulties under which the independent colleges and universities, and particularly the independent liberal arts colleges, are laboring to get back on their feet financially have been discussed in previous editorials in this series. These difficulties underline the need of special help for these institutions to which business firms are now contributing in increasing volume. However, the problem of providing better salaries is not peculiar to any particular type of institution.

Faculty Members Not Greedy

It is not easy to prescribe a precise standard of fair pay for college and university faculty members. This is partly because they put less weight relatively on money rewards than they put on rewards of scholarly accomplishment and prestige. Consequently, they have consistently been willing to work for very modest salaries in relation to the intellectual ability, education and application required. Obviously, however, it is the dictate both of fairness and good judgment to see that faculty members are given a roughly proportionate share in the general prosperity. Indeed, their crucial role in our society could be made to justify a larger share than this.

There is no way to know with any degree of precision what the underpayment of our college and university faculty members over the past 14 years has actually cost the nation in terms of reduced quality of intellectual performance of those institutions. One reason is that the damage has been minimized by the devoted services of many faculty members who have loyally stuck to their jobs in spite of the great financial discouragement.

It is obvious, however, that, if no grave deterioration in the intellectual performance of our colleges and universities has occurred so far, it is because we have been living on borrowed time. It is time borrowed from faculty members who have, in effect, been subsidizing these institutions by their financial sacrifice. This arrangement is not only a menace to the cultural and intellectual life of the nation, it is also a menace to our national security in a time when successful national survival may well depend in peculiar degree on the full development and utilization of our intellectual resources. We depend on our college and university faculties pre-eminently to provide this development. Adequate financial reward for such service is an elementary form of national insurance.

Many of our colleges and universities are working hard to improve the financial lot of their faculty members. Business firms are also playing an increasing role of providing the necessary financial assistance. The methods being used by business for this purpose will be the subject of another editorial in this series. However, **vastly more must be done, and quickly, to stop the financial beating being taken by our college and university faculty members if the nation's welfare and safety are to be properly protected.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

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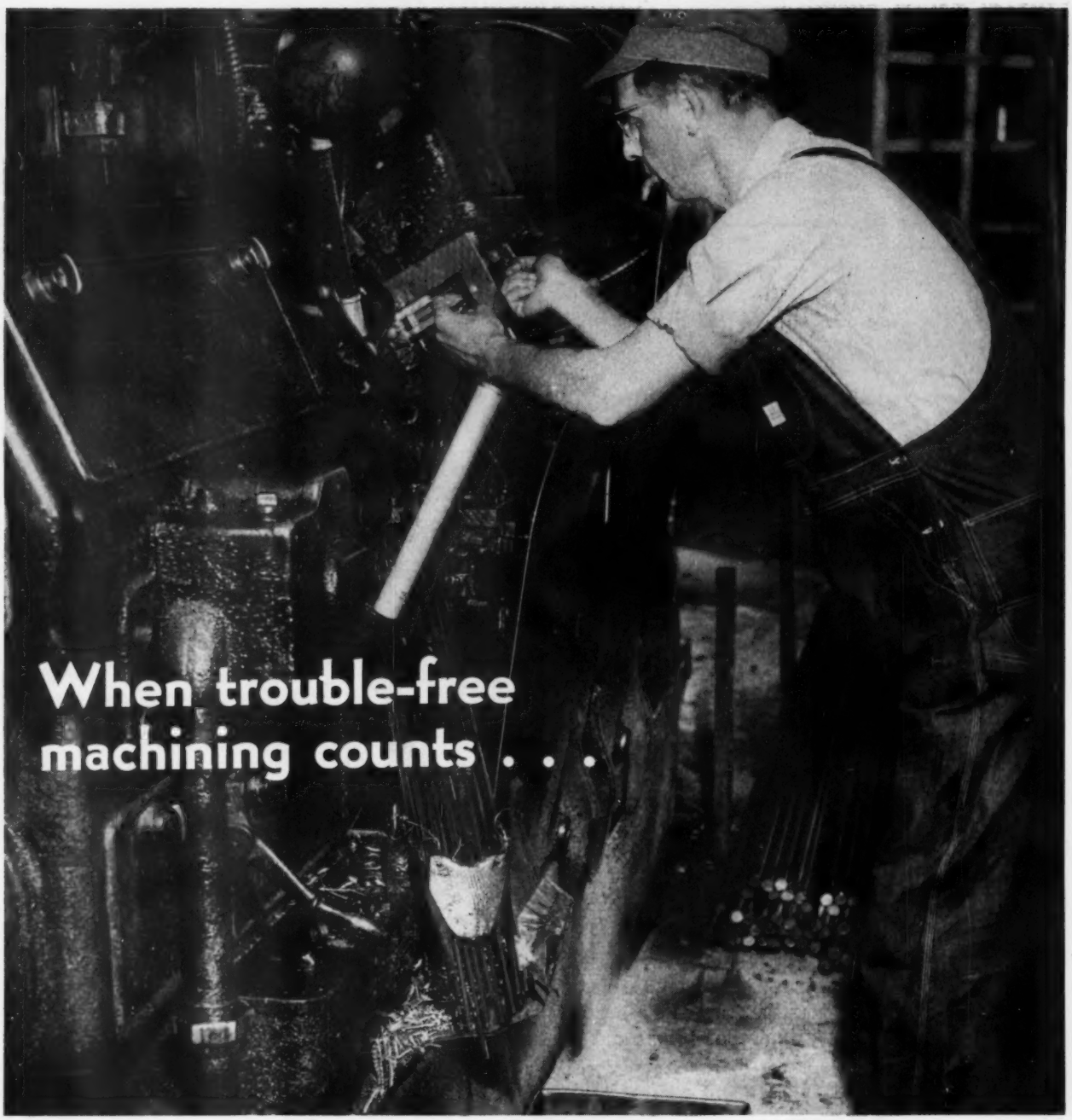
of consideration for others, thoughtlessness and dare-deviltry. We are familiar with the individual who proceeds to beat the red light with obvious pleasure, or takes foolhardy chances on the job. He's the type who needs safety education in large doses.

An industrial accident is almost always a symptom of something wrong in the production process; something wrong with the man, the machinery, the method, or the materials. Therefore practically all accidents are prima facie evidence of defects in the working environment, of inefficiency in supervision, poor selection and placement of workers, or the lack of adequate training. Correction of these deficiencies prevents not only the occasional personal injury but the far more frequent near-accident, stoppage, or delay. This concept of safety therefore identifies accident prevention with sound business procedure.

As part of an accident prevention program, in seeking to find the answer to accident-proneness of certain workers, a study should be made of the machine and the operator. The analysis of the machine used by the operator should involve the determination of the velocity and force distribution and spatial travel of external parts. The analysis should include the noting of all points to which access of the operator must be positively prevented. Such protection should be considered minimal so that the operator, in the performance of his normal functions and when unpredictably stimulated to perform spontaneous or instinctive motions or actions not required by the task, will not be subject to injurious contact. Included in this study should

"The boss had to lay her off, so we're taking a weekly collection to keep her around!"



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be the efficiency of the man for the work under varying conditions present and his responses to color, vibration, temperature extremes or changes, illumination, noise levels, and other stimuli which may cause abnormal performance. These studies are necessary before an accident-prone worker is shifted to another job, or psychiatric aid is resorted to by Personnel.

The foreman should try to help the employee who seems worried. Accident-proneness is often heralded by chronic worrying. An employee who is worried about conditions at home, his personal finances, his security in his position, or anything else, is much more likely to have accidents than one who is not worried. If one of his workers appears to be worrying about something, the foreman should tactfully try to find out what is causing the anxiety.

Harry Kaufman
Philadelphia, Pa

SPOT DEMOTION

Should the foreman explain to a worker his reasons for shifting him from one machine or job to another? Will such an explanation eliminate misunderstanding and resentment, or is it unnecessary?

I AM AFRAID that Ed overlooked a few important factors that all supervisors should be aware of. Ed is demanding recognition of his individuality and his position but he is failing to give this recognition to his workers.

Every job in the plant is important because it is being performed by a human being. The work is not performed by groups of men, it is performed by individuals. Whether he be general manager or sweeper,

"Whee! A Pink Slip . . . what do I win?"

Sensational Advance in Screw Machine Tools!

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- Maintain uniformly high concentricity
- Cut collet inventories as much as 65%

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In a Rubber-Flex Collet, steel inserts permanently bonded to rubber, hold the stock firmly . . . automatically "tighten" their grip as the power of a cut increases. The inserts have uniform hardness . . . give long wear under rugged conditions. In operation, the unusually high concentricity of a Rubber-Flex Collet assures top accuracy on the finest work. And collet faces seal flush against the chuck nut . . . protect the spindle unit from chip-laden coolant.

Get the outstanding benefits of Rubber-Flex Collets on all your round stock jobs — and on second operation work where the piece utilizes the full bearing surface of the collet. Available singly or in sets. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

*Rubber-Flex is a trade-mark of the Jacobs Manufacturing Company who makes these collets for us.

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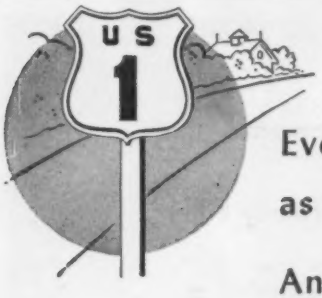

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Crystal Universal Toolholder is drop forged from a special steel, accurately machined, heat treated and hardened.

Crystal Toolholder can now be supplied in two sizes, — one being suitable for ⅜" square, ⅜" Round Toolbits; ⅜" dia. Boring Bar and 0.475 x ⅛" x ½" x 4½" Special Parting Off Blade—the other to suit ¼" square, ¼" round Toolbits; ¼" Boring Bar and ¼" Parting Off Blade.

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his chief and all-absorbing interest is the same—himself. The foreman who has learned this, and applies it, builds up a sense of participation among his group and they are not irritated by many small events out of which they might otherwise make an issue.

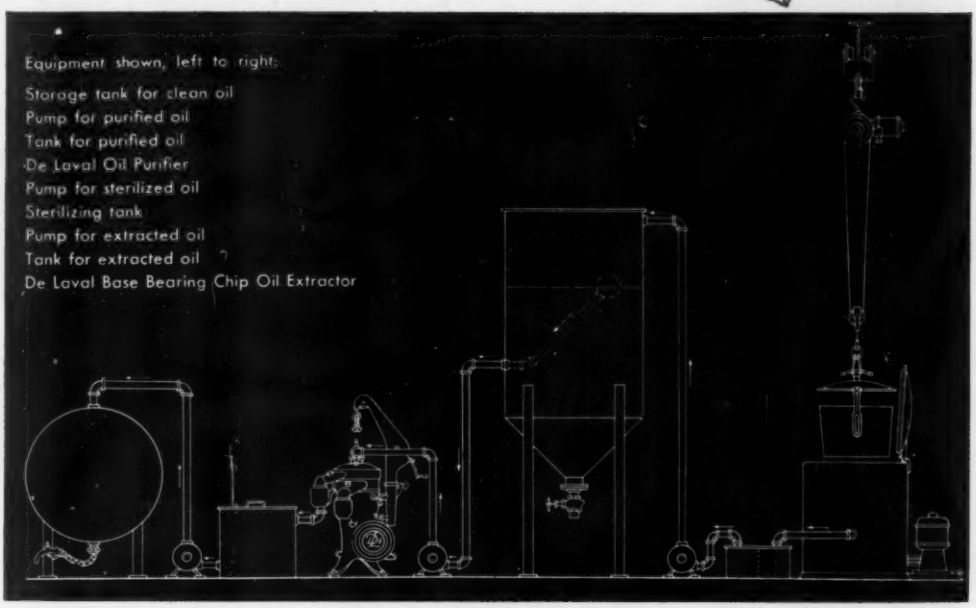
In a plant where this individual consideration has been overlooked the workers are irritable, uncooperative, and quarrelsome. In the smooth-running plant with the friendly attitude the thwarted unconscious desires are few in number and unimportant in scope. In the plant where no individual recognition is accorded the workers and they are regarded as so many numbers or time-cards, the tensions created by the blocked desires and urges will show on the surface, not as demands for recognition of their individual personalities, but as bickerings among themselves, petty jealousies, and unwillingness to do something they are not paid for even when the need for it is obvious, and failure to do it promptly may mean loss or damage.

It is a simple matter for the foreman to explain to the man why he is being put on a new machine or taken off an old job. A few minutes spent in this way pays big dividends in improved good will, employee satisfaction, and the result of these, namely, increased production. The man may feel that the foreman is making an error in effecting this transfer, but at least he knows that he is regarded as sufficiently important to be given an explanation of the reasons for the change.

Supervisors are constantly creating attitudes in their subordinates, whether they do it intentionally or not. The good supervisor is the one who sets forth with deliberate intent to build up in his men the frame of mind that he considers desirable. The difference between the slightly favorable attitude and the slightly hos-

"—Now that I've passed the plant physical, I'd like to say I just came here to deliver some equipment!"

LAYOUT... FOR PROFITS!


Equipment shown, left to right:
Storage tank for clean oil
Pump for purified oil
Tank for purified oil
De Laval Oil Purifier
Pump for sterilized oil
Sterilizing tank
Pump for extracted oil
Tank for extracted oil
De Laval Base Bearing Chip Oil Extractor

This is the layout of a typical De Laval Cutting Oil Extraction and Purification System. Principal components are a De Laval Chip Oil Extractor and a De Laval Oil Purifier.

Similar De Laval Systems—custom-engineered to the specific requirements—save money in many leading metal fabrication plants . . . by more efficient reclamation of oil. *Some have actually returned their entire cost in a single year!*

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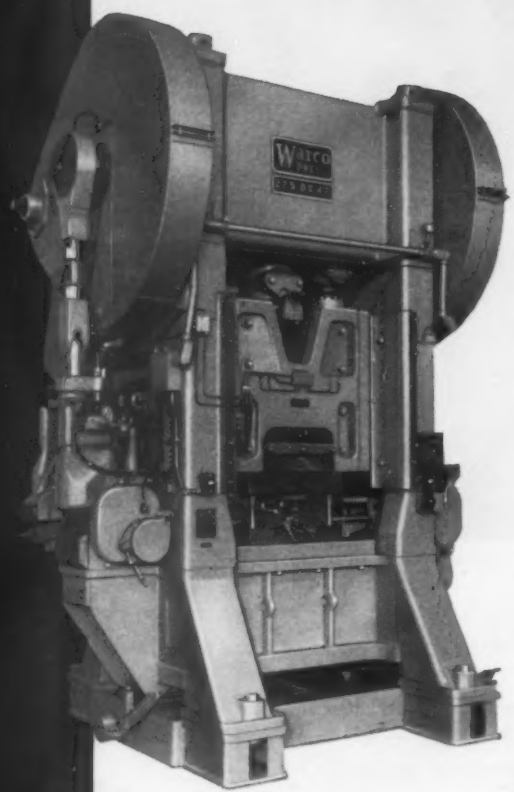
Warco the QUALITY LINE of presses



Working for the government this Warco Special Cartridge Case Press blanks and cups two 30mm cases with each stroke.

Special features include four post die set, roll feed, slide type scrap cutter with gag attachment for adjustable speed to control length of scrap, a built-in conveyor that removes finished parts through back of press, a stock locating device that prevents improper blanking.

It is a two slide press with both slides operating off one eccentric shaft with two throws. A safety feature stops press when end of strip will not give a complete blanked and cupped part. Every Warco Press is precision built and thoroughly inspected to meet customer's requirements. Every day more of the nation's metal fabricators recognize Warco's higher quality.

Federal WELDERS

Warco PRESSES

The Federal Machine and Welder Company

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tile attitude may be very small, but it is this difference which determines whether the man is for the supervisor or against him. Favorable attitude in a plant grows slowly but can collapse quickly, so why take a chance. Take a few minutes to show the man that he is important, wanted, and needed and necessary to the organization.

Henry George
Bronx, NY

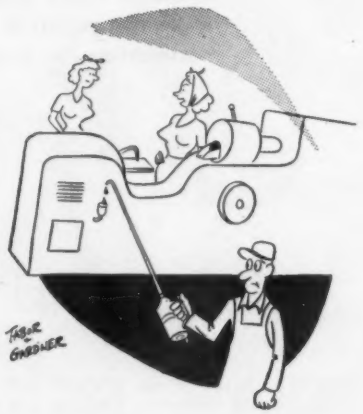
SPOT DEMOTION IS OUT. It is not conducive to employee morale.

Ed rather brusquely removed Browning, a jig-borer operator, from his job. Ed kney someone could do the job better. Browning's feelings were hurt. Moreover, Browning began to build up a feeling of resentment against Ed in the shop. Ed took the "heat." He has adopted the stupid old "take it or leave it" — defense mechanism.

This ill-feeling, generated by a spot demotion, seems childish, but it is a serious thing. Children quickly get over a grudge; industrial workers sometimes harbor one for years. Such a spirit of animosity has a detrimental effect on an important asset to a competitive enterprise, employee morale.

Management, of which Ed is a part, is rated on its ability to bring out the utmost capacity residing in each employee. A foreman must be more than a mere getter-outer of production. He must know how to get along with people, how to make them feel like giving the best they've got. High employee morale is essential to industrial efficiency.

Leadership ability is now a prerequisite of a foreman's job Leadership, being an elective office, requires the building up of a loyal following through an accumulation of goodwill. A competent foreman does not order



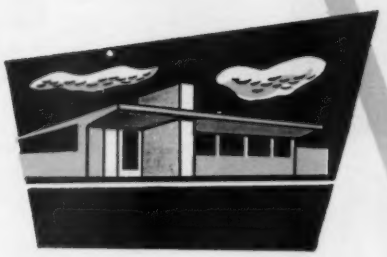
"It's that new man . . . the bashful one."

MUELLER BRASS CO.

FORGINGS

ARE MADE TO LAST!

QUALITY PARTS AND PRODUCTS FORGED AND MACHINED OF BRASS, BRONZE AND ALUMINUM OR MAGNESIUM



IN THE HOME

IMPELLER DISPOSER

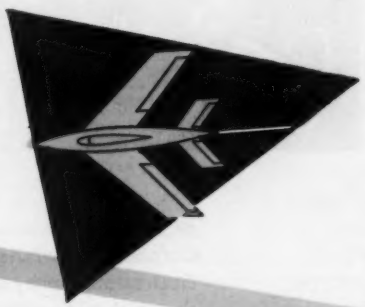
One of four Mueller Brass Co. parts in modern waste disposal unit. Completely dependable in daily operation.

WINDOW HARDWARE

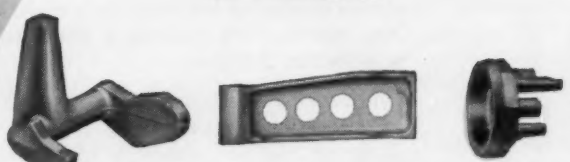
Forged of natural bronze. Can be furnished in aluminum or chrome finish as desired. Retains original beauty indefinitely.

BURNER HEAD

Forged of aluminum for installation in gas stove. Lightweight yet strong.



IN AVIATION



LANDING GEAR TORQUE ARM

SUPPORT MEMBER

INSTRUMENT HOUSING

These aluminum forgings provide the same strength as steel yet weigh only 1/3 as much. Smooth bright surfaces save machining time and eliminate costly finishing.

Specially designed forged housing for sealing diaphragm in aviation pressure warning unit.

IN INDUSTRY

CONNECTING ROD

Forged from "600" series metal. Over two million connecting rods produced without recorded failure.

ACTUATING GEAR

Forged from special Mueller Brass Co. alloy. Must take constant pounding.

AUTOMOTIVE GEAR

Forged of "600" series metal for use in automotive automatic transmission. Replaced part that was giving constant trouble; solved costly problem.

All Mueller Brass Co. forgings, of which just a few are shown here, have a dense, close-grained structure with a high tensile strength. Weight savings up to 40% are possible in the design of parts because of the close tolerances to which they can be produced. Less scrap and longer tool life result from the easy machinability of forged parts. Mueller Brass Co. is completely equipped to design parts for your products, specify alloys (including special alloys developed by our metallurgists), forge, machine, finish and plate the parts and perform all necessary assembly operations. Write today for our free illustrated 32-page forgings catalog and complete information about MBCo forged parts for your products.

140

MUELLER BRASS CO. PORT HURON 23, MICHIGAN

● When Studebaker Division, Studebaker-Packard Corporation switched to Ransburg No. 2 Process of Electrostatic Spray painting on their automobile chassis, paint mileage was increased 9 times.

By simply putting the paint where it's supposed to go, Studebaker cut daily paint consumption on the chassis production line from 14½ drums to 1½ drums. And, still they are painting 6 more chassis per hour with the No. 2 Process.

In addition to getting better, more uniform coverage with the asphalt-type coating, paint and labor costs were cut 70¢ per chassis. In eliminating the former set-up with 2 water wash booths and 12 automatic spray guns, they save nearly 1000 square feet of badly needed floor space.

Another on-the-job-example of the unmatched efficiency of the Ransburg No. 2 Process in which quality of the work is improved . . . AT LESS COST!

**Studebaker also uses the Ransburg method to apply a heavier and more uniform primer surfacer on automobile bodies.*

Whatever your product—large or small—if your production justifies conveyorized painting, it's possible that one of the Ransburg electrostatic processes can do the job better, with substantial savings to you. We'll be glad to tell you about complete Ransburg services.

Write to Dept. A.M.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

his men around. He is reasonable. He is persuasive. He thinks carefully before passing judgment.

Persuasive speech is not difficult for an honest, sincere man. Point out that which is in a workman's favor. Stress his good points. Follow it up with a little logic. End with a positive recommendation for immediate action. Smile. Be charitable. Put the cards on the table. Face the facts. Be just. Smile again.

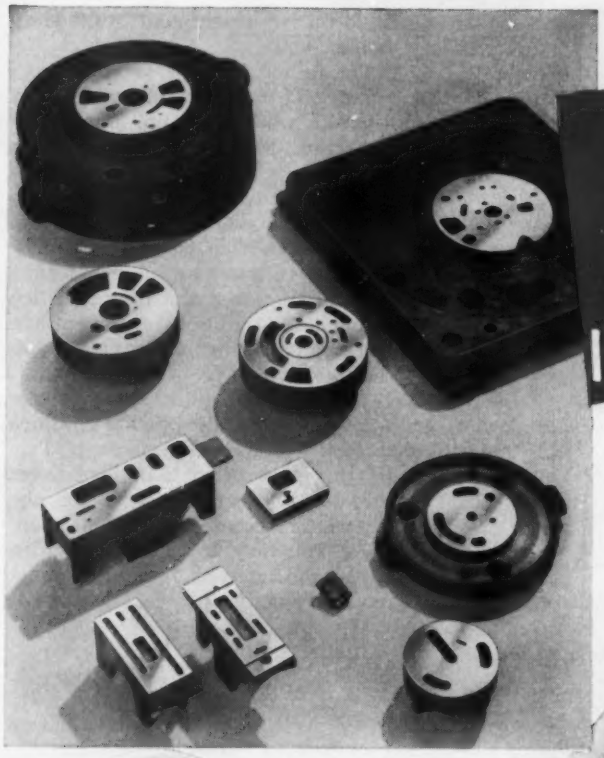
A foreman is entitled to make a mistake once in a while. Browning should realize this. After all, an industrial plant is a competitive enterprise. It is no place for a thin-skinned person, one whose feelings are easily hurt. Foremen are under constant pressure to improve quality, reduce costs, and cut down processing time. This must be done without creating friction of any kind.

Sensitive man is of primary importance to the free enterprise system. The insenate machine is of secondary importance. A machine by itself neither produces nor consumes. Left alone and unattended a machine will gather dust and rust and crumble and be blown away by the wind. The workingman alone can make a machine produce. How the machine operator feels about the boss has a great deal to do with how efficiently the machine produces.

A good foreman is careful to keep the morale of his men at a high pitch. The intention not to hurt their feelings is not enough. Think before you act. Whether the resentment of a worker is justified or not, the effect on morale is the same—bad.

There is a logical substitute for spot demotion. Keep the worker informed of his progress, or the lack of it. Keep a record of what you tell him. Let the men know that this is your habit. Your decision to take a man away from his job will then be a logical one. It will be difficult to

"I had ambitions once . . . then they started aptitude tests . . . and here I am!"



Get Precision Flatness, Finish and Parallelity on Valve Parts Like These . . . In Production Quantities With a

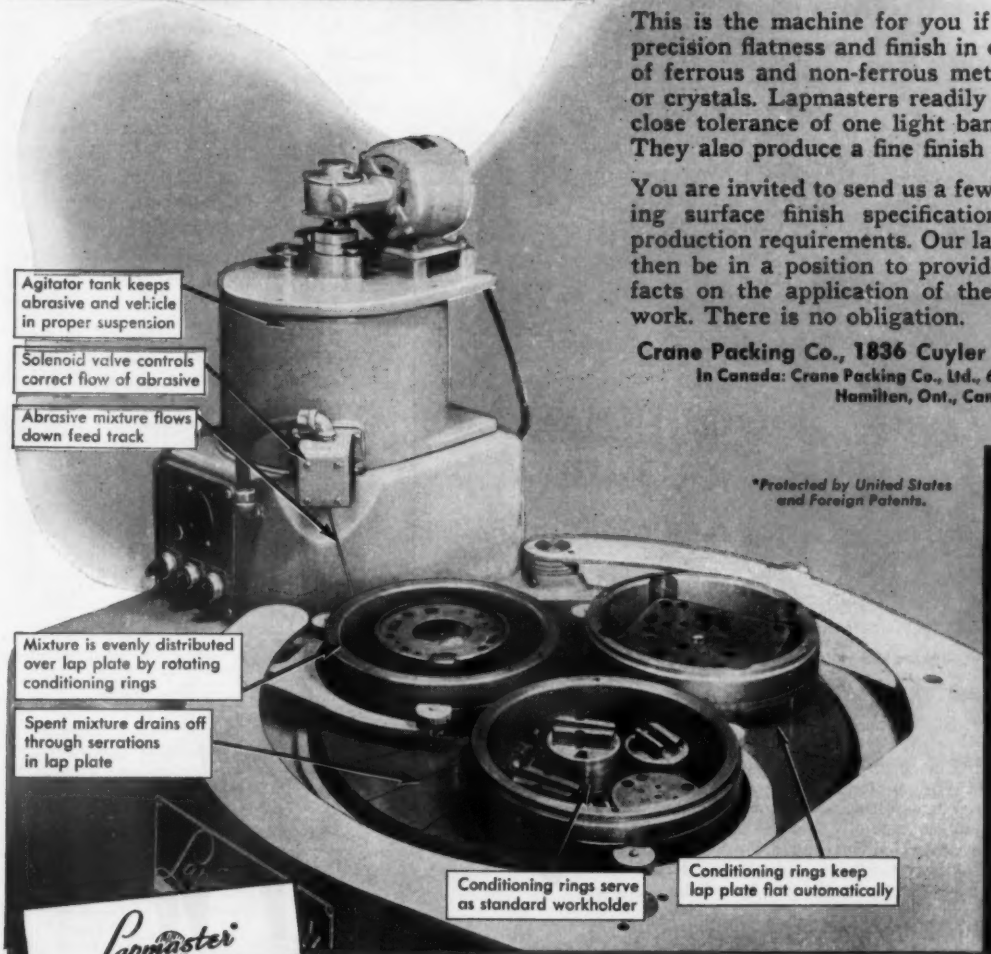
Lapmaster®

Air brake valve parts like these are being production lapped on JOHN CRANE Lapmasters every day at a tremendous savings in time and money. For instance, one of the rotary valve seats shown here formerly required over two hours of lapping time to pass the "no leak" bubble test — time has now been cut to ten minutes on the Lapmaster.

This is the machine for you if you are looking for precision flatness and finish in quantity on all forms of ferrous and non-ferrous metal, ceramics, plastics or crystals. Lapmasters readily lap to the extremely close tolerance of one light band (.000011") or less. They also produce a fine finish to as low as 1 RMS.

You are invited to send us a few sample parts including surface finish specifications and approximate production requirements. Our lapping laboratory will then be in a position to provide you with complete facts on the application of the Lapmaster to your work. There is no obligation.

Crane Packing Co., 1836 Cuyler Ave., Chicago 13, Ill.
In Canada: Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont., Canada


Agitator tank keeps abrasive and vehicle in proper suspension
Solenoid valve controls correct flow of abrasive
Abrasive mixture flows down feed track
Mixture is evenly distributed over lap plate by rotating conditioning rings
Spent mixture drains off through serrations in lap plate
Conditioning rings serve as standard workholder
Conditioning rings keep lap plate flat automatically

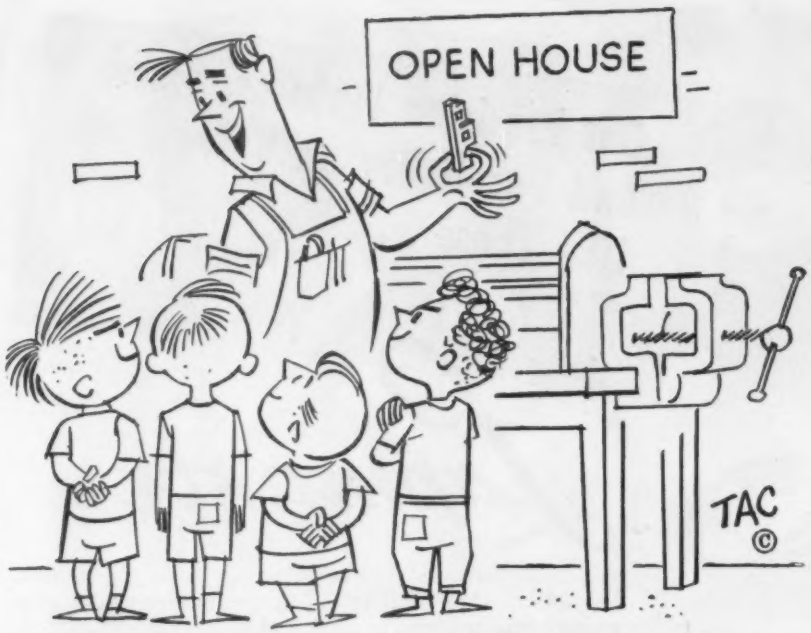
*Protected by United States and Foreign Patents.

FREE TECHNICAL DATA
on the Lapmaster is available on request, also information on measuring flatness. Write for your copies today.

Lapmaster DIVISION

CRANE PACKING COMPANY

38 YEARS INDUSTRIAL PROGRESS



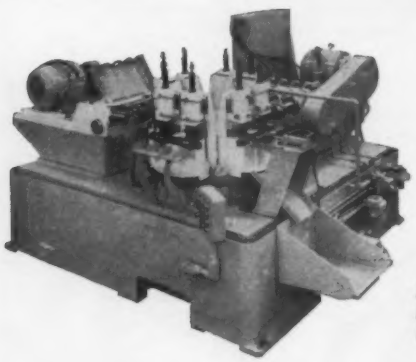
"... these dies are so tough even you kids can't destroy them. They're made of ATMODIE® air hardening die steel."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

Precision Pumps for Precision Machinery



Hartford Special Drilling Machine Equipped With a Ruthman Gusher Coolant Pump.

RUTHMAN GUSHER

Coolant Pumps

Gusher Coolant Pumps are precision built of the finest materials. The rotating shaft is electronically balanced to cut vibration wear to an absolute minimum. The motor is totally inclosed and drip-proof. The heavy-duty ball-bearings are pre-lubricated. You can specify Gusher Coolant Pumps for your precision machinery with the sure knowledge that they will give you efficient service at low maintenance cost.

THE RUTHMAN MACHINERY CO.

1818 Reading Road Cincinnati, Ohio

build up any resentment in the shop against you.

The following three steps are recommended in removing a man from a job for which he is not immediately suited. First, go over the man's good points and good work. Secondly, point out exactly what has to be done now, why it has to be done, and how it is to be done. Finally tell the worker why he is not suitable for the job now. Simple justice demands that a foreman prevent one workman from jeopardizing the job security of many.

The foreman must always take some blame for the worker's failure to make good at the moment. This is true more often than not. Offer the demoted worker hope for the future. Try hard not to lose his goodwill. You may want him to return to the job later. A foreman can remove a man from a job; he cannot make him go back to it.

Human nature is a foreman's most important problem. The industrial worker must be handled with kid gloves, softly but firmly. Leading advocates of the free enterprise system have taken a new look at the worker. They see more than just a producer; they see a consumer, a most desirable customer.

There are ups and downs to every managerial position, including the foreman's. It is well to bear two things in mind. The same rungs of the ladder are used for the downs as are used for the ups. Secondly, you cannot go wrong maintaining high morale in your department. Such will insure you of meeting friends on the way up and on the way down —where you will really need them.

Peter A Seward
Swampscott, Mass

"I don't know what we'd ever do without you, Smedley . . . but we're going to."

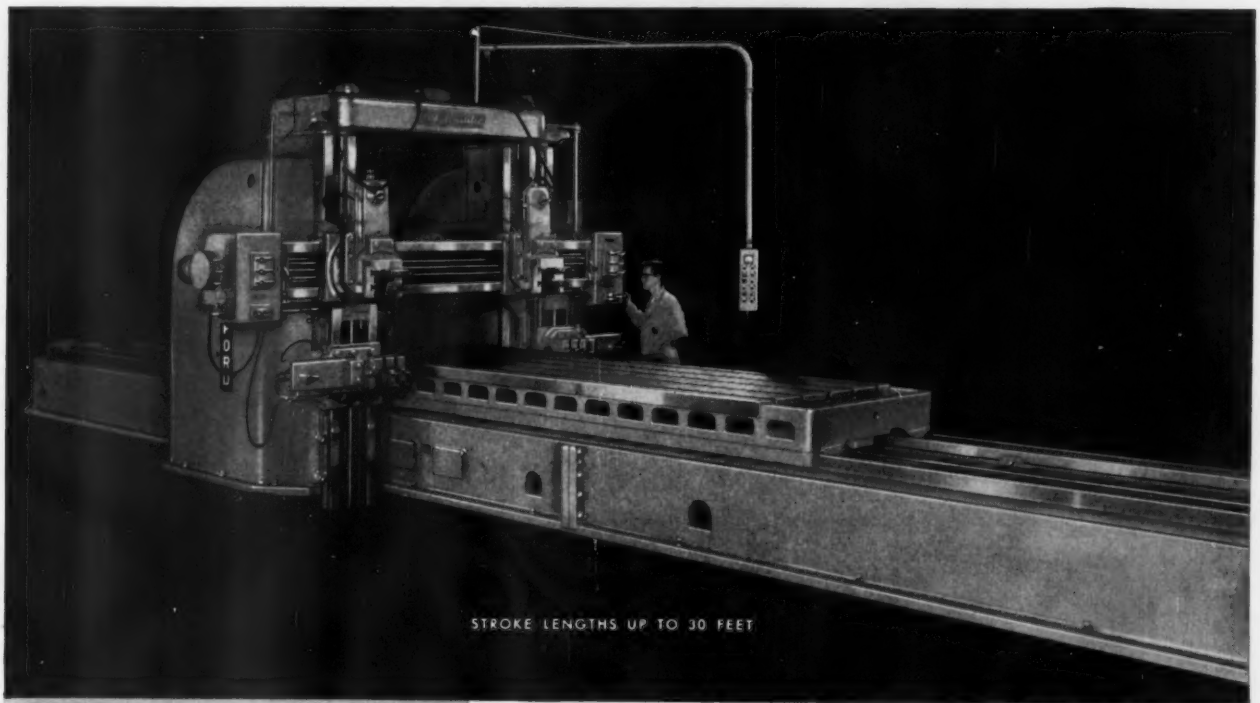
HYDRAULIC

fast, economical production calls for

HYDRAULIC

hydraulic planers with exclusive triple circuit

HYDRAULIC



STROKE LENGTHS UP TO 30 FEET

Hy-Draulic

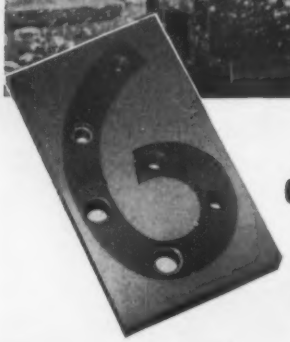
Hydraulic Drive is a natural for reciprocating-type machine tools. It provides smooth, powerful cutting, fewer moving parts, and longer useful life.

Hydraulic Planers have the new Triple Circuit which provides easy selection of the correct combination of cutting speed and force to most economically machine every type of material — free-cutting materials to the toughest steels.

When you modernize your production facilities plan on Hydraulic Shapers, Planers and Slotters to provide the fastest, most economical production methods.

ROCKFORD MACHINE TOOL CO.

2500 Kishwaukee Street • Rockford, Illinois

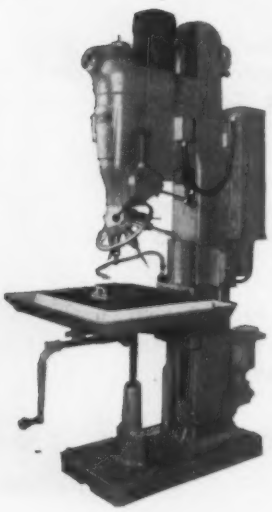


different DRILL or TAP operations on one press

The Howe & Fant Turret Drilling Machine.

Pre-set depths, pre-set speeds and reversals, all attention-free during successive operating cycles.

- **Depth stops**—individually set for each spindle, accurate to less than 0.002 in.
- **Speed**—each spindle independently controlled, infinitely variable from 200 to 4000 rpm.
- **Tapping**—each spindle reverses automatically at twice forward speed.
- **Capacity**—½ inch. Floor space required—34 x 50 inches.



hf
HOWE & FANT

Send for H. & F. Bulletin
HOWE & FANT INC., 27 Fitch St., East Norwalk, Conn.

Your name _____

Position _____

Company _____

Address _____

New Films . . .

PRODUCTION BAND MACHINING—*Produced by The DoAll Co, 254 N Laurel Ave, Des Plaines, Ill. 16 mm, sound, color. Running time 30 min.*

This film demonstrates the rapid machining of duplicate parts with a contour-cutting band machine equipped with a powered worktable plus the use of simple fixtures.

The film demonstrates the ability to remove unwanted material in whole sections that can be salvaged and the elimination of clamps because of the constant downward pressure exerted by the cutting tool. Shown are all the operations involved in machining a number of parts.

Applications of different band tools are shown, permitting such operations as filing, grinding, polishing, and slicing operations.

•

ACCENT ON ACCURACY—*Produced by Pratt & Whitney, Div Niles-Bement-Pond Co, West Hartford 1, Conn. Color, sound, 16 mm. Running time 28 min. No charge.*

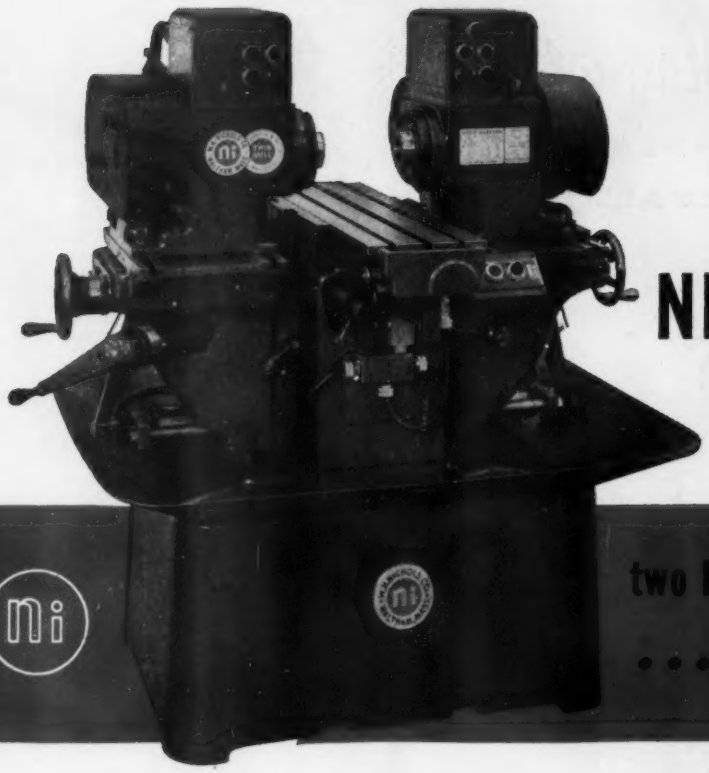
Telling the story of the P & W jig borer, this new film starts out by showing how the science of precision measurement was developed from the Rogers-Bond comparator with an accuracy of one one-hundred thousandth of an inch, through the standard measuring machine, to the Electrolimit system. An important sequence shows how such precise measurements are built into the jig borer to permit repetitive accuracy in the product.

Other scenes show methods used in constructing the machines to insure accurate performance, and practical applications of jig borers to precision machining and inspection work.

•

NOTHING BUT THE BEST—*Produced by Air Reduction Sales Co, 60 E 42nd St, New York 17, NY. Color, sound, 16 mm. Running time 20 min.*

Heliwelding has already made an important place for itself in the field for which it was specifically designed—the welding of "difficult" metals, such as nickel, stainless, aluminum, copper alloys, titanium, and other materials. Just how the process works, and how it produces welds that increase sales appeal, is the



NICHOLS TWIN MILL

two heads are better than one ....for sure!

The Nichols Twin Mill is something new in duplex millers — a precision 2-spindle bed-type miller designed for simultaneous light duty milling of opposite or adjacent surfaces, using **horizontal or vertical spindles.**

The Twin Mill provides unmatched flexibility! It is equally adaptable for long-run or short-run jobs. The two geared milling heads are independent units, with separate 1 HP motor drives, and are quickly adjusted either directly opposed or offset longitudinally, vertically or transversely. Set-up is fast and simple.

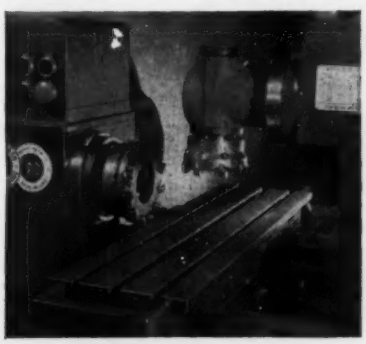
The wide range of spindle speeds from 55 to 2050 R.P.M. allows milling of ferrous or non-ferrous materials with high speed or carbide tipped cutters, producing EXTRA FINE FINISH while maintaining the closest tolerances with ease.

The Twin Mill is completely push-button controlled, arranged for automatic table cycling — with rapid approach, hydraulically controlled variable cutting feed and rapid return. Available with automatic retraction of milling heads, automatic spindle brakes and carefully engineered special features to meet specific applications.

The parts shown are typical of those on which the Twin Mill is cutting costs and boosting production. Investigate the savings it can make for you. For details write to Nichols-Morris Corporation.

CONDENSED SPECIFICATIONS

Table, working surface	8⅝" x 30"
Table Travel—cutting stroke	11¾"
Motors	(two) 1 HP
Spindle Speeds (15)	from 55 to 2050 RPM
Max. height center of spindle above table	11¾"
Max. offset of spindles (horizontal)	8½"
Max. distance between spindle noses (across table)	16"
Floor space required	64" x 56"

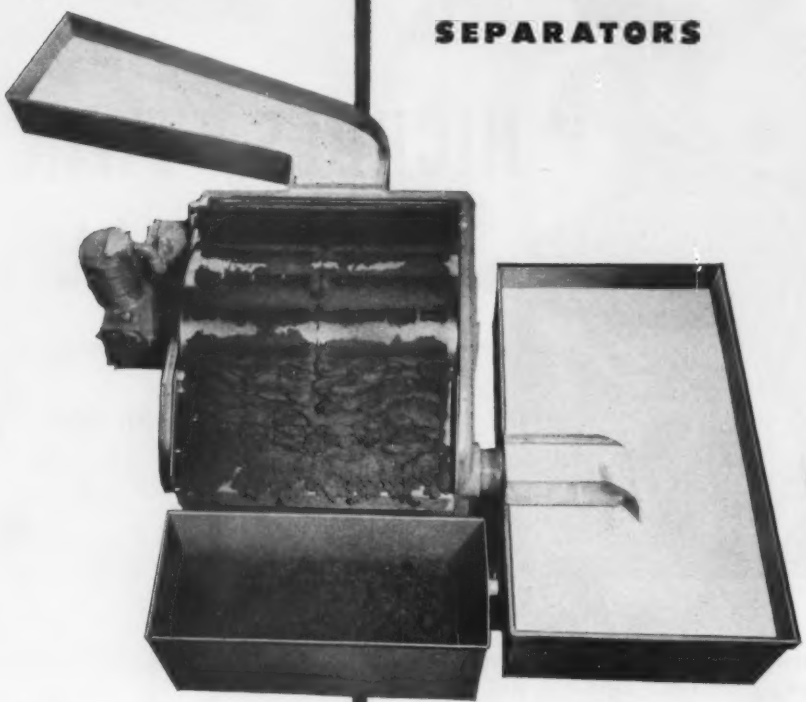


Manufactured by W. H. Nichols Company, 48 Woerd Avenue, Waltham 54, Mass.

76-F Mamaroneck Ave. NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION** **White Plains, New York**

BARNESDRIL

Magnetic
COOLANT
SEPARATORS



give you these features for

Practical
COOLANT
CLEANING

✻ **AUTOMATIC** — The Separator requires no attention other than periodic emptying of the sludge pan.

INTENSE MAGNETIC POWER — coolant flow is restricted to intense magnetic field so that more ferrous material, entrained abrasives and other foreign matter is removed per minute per gallon than by any other method.

DOUBLE CLEANING ACTION — magnetized particles form a fan-shaped pattern on the surface of the magnetic drum which serves to "comb out" free abrasive or other materials as the drum rotates.

RAPID SEPARATION — coolant is processed rapidly, flowing by gravity through the separator, for effective circulation at all times. No additional coolant supply necessary to compensate for the cleaning operation.

See your Barnesdril representative or write for Catalog 3004.

Barnesdril Automatic Coolant Separators remove swarf, sludge and abrasive particles automatically from soluble and oil coolants. Built in ten sizes — 1½, 3, 5, 10, 20, 30, 70, 100, 280 and 350 gallons per minute capacity.

COOLANT BARNESDRIL CLEANING

BARNES DRILL CO.

830 CHESTNUT STREET • ROCKFORD, ILLINOIS

theme of this new movie. Typical applications of Heliwelding—production scenes shot in customers' plants—show manual, semi-automatic, and fully mechanized equipment in use. Animation explains in concise detail just how the process works.

•

DIE CASTING—HOW ELSE WOULD YOU DO IT?—*Distributed by American Zinc Institute, Inc, 60 E 42nd St, New York 17. Color-sound 16-mm film running 35 min.*

Aside from the samewhat pointless title, the film is a good introduction to die casting—aluminum, magnesium, and copper as well as zinc—and shows many examples of die castings in application. Several good sequences of production at the presses are shown, and some finishing operations are filmed.

AZI books showings and arranges for distribution of 24-page booklet giving more details on die casting at each showing; also arranges through American Die Casting Institute for technical commentator at showing.

•

MACHINING THE UNMACHINABLE—*Produced by The Sheffield Corp, Dayton 1, Ohio. 35-mm slide film, sound. Running time 16 min.*

Features one of the most fascinating of modern machining techniques, the cutting and shaping of the hardest materials known to man, by use of ultrasonic energy in the Cavitron machine.

•

PRECISION METAL FORMING. *Produced by The Cyril Bath Co, 32340 Aurora Road, Solon, Ohio. Sound, color, 16 mm. Running time 31 min. No charge.*

This new film traces the development of the radial draw former which combines the principles of rotary stretch and rotary compression forming. It shows how the traversing compression unit irons the work against the die when forming curved, angle-changing, and multi-plane parts in stainless steel and high-tensile aluminum. Joggling and reverse bending are also demonstrated, and the film concludes with some views of the giant forming machines scheduled for the aircraft industry. Metallurgical proof is given that the radial draw process improves the physicals, and that parts are formed to machining tolerances without wasting costly materials in the form of chips.

A NEW LEADER *in Precision Grinding*

Boyar-Schultz
6-18 Hydraulic
Surface Grinder

BOYAR-SCHULTZ CORPORATION

Chicago • New York • Los Angeles

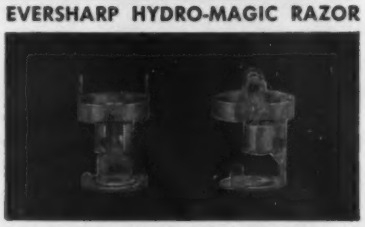
RELY ON B. JAHN PRODUCTION PROVED DIES TO KEEP QUALITY UP, OPERATING COSTS DOWN!

Manufacturers who supply millions of products — for millions of people — use progressive dies that produce with precision throughout long production runs. No chance of interrupted production, no costly breakdowns, no delays, no imperfections in die or finished piece — that's why the best known names in industry specify "B. Jahn Production Proved Dies."

B. Jahn dies are painstakingly engineered for performance! Above all, every B. Jahn die is "Production Proved" in actual operation. This means up to 50,000 pieces can be run and delivered for inspection or assembly line use before the tool is shipped — a production tool warranted to operate in the customer's equipment to his complete satisfaction.

CARBINE MAGAZINE

EVERSHARP HYDRO-MAGIC RAZOR



CAR CIGARETTE LIGHTER PARTS

RADIO LOUDSPEAKER PART

RAZOR BLADE CASE

Yours on request! The fact-filled "Story of B. Jahn Production Proved Dies."

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

Names in the News . . .

Locke H Jones, Jr, has been appointed sales manager of Moore-Handley Hardware, Birmingham, Ala, machine tool distributors.

H De Rosa, formerly sales manager of Ketay Manufacturing Corp, has been named general manager of Infra Electronic Corp, Roseland, NJ.

Firth-Loach Metals Inc, McKeesport, Pa, has appointed **Robert C Lindberg** superintendent of production, and **William C Seitz** manager of research and development. Both men were formerly associated with Firth-Sterling — Mr Lindberg as engineer in charge of development for the Carbide Production Department, and Mr Seitz as assistant manager of the Carbide Research Department.

Heppenstall Co, Pittsburgh steel forgings manufacturer elects: **Irvin E Walton,** purchasing agent, to vice president in charge of purchases and traffic; and **Howard G Grim,** general manager of operations, to vice president, manufacturing.

Baker Brothers, Inc, Toledo, Ohio, has appointed **John Hoenig,** engineering and methods, to head a new die cushion and plastic press department. **Norman W Oberle,** formerly merchandising manager of Allied Chemical & Dye Corp's Barrett Division, has been named to a similar post in the new department.

Edward W Forth, assistant plant superintendent of DeWalt Inc, Lancaster, Pa, has been promoted to general superintendent. He succeeds **Harold Sneed,** retired.

W A Marquardt, secretary of the D J Murray Manufacturing Co, Wausau, Wis, has been appointed assistant manager.

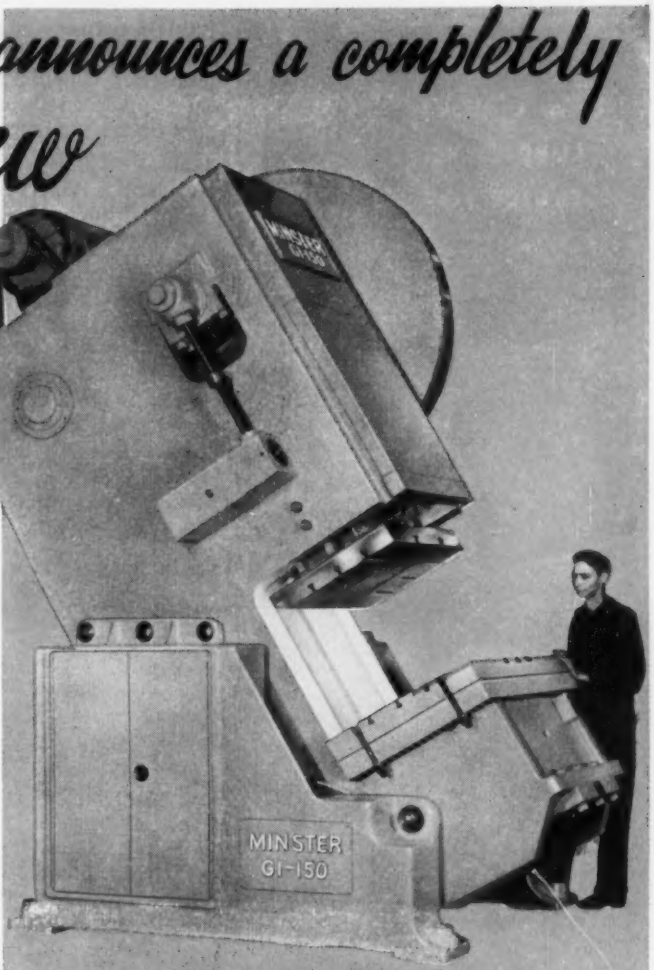
Warren H Brand, director of engineering and research at Conoflow Corp, Philadelphia, has been elected vice president in charge of these fields.

Guy M Karm, assistant purchasing agent of Aetna Ball & Roller Bearing Co, division of Parkersburg-Aetna Corp, Chicago, has been promoted to purchasing agent. He succeeds **B E Vergowe,** retiring after 35 years' service.

Wayne F Strong, vice president, manufacturing, of Iron Fireman Manufacturing Co, Cleveland, has been named president.

Minster announces a completely New

STEEL FRAME GAP PRESS

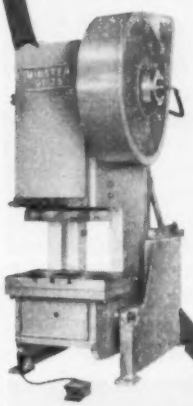


MINSTER G1-150 ton geared type gap press—Motorized Inclining—Cabinet Legs house all electrical and air controls—Connect Air Line and Plug in power; in seconds, it's ready to operate.

SERIES G1 PRESSES

Patents Pending

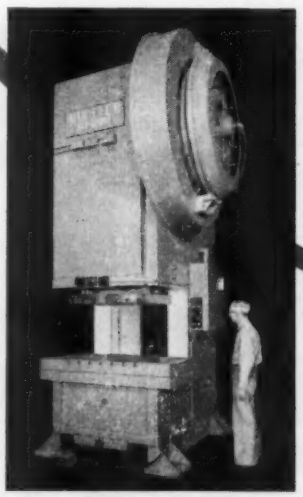
Today's most rigid and efficient gap presses—G1 Steel Frames, are engineered and fabricated with a completely new approach to the problem of achieving minimum deflection in steel "C" frames for gap presses.



CAPACITIES OF
75, 110, 150 and 200 Tons

- Fixed Base or Inclinable
- Flywheel or Geared Types
- Minster Patented Combination Air Friction Clutch and Brake
- Barrel Slide Adjustment and extremely long Slide Ways
- Power Inclining

Series G1-75 flywheel type inclinable gap press with manual inclining and standard leg.



The 200 ton G1 fixed base geared type gap press—Available with either bed attached or sliding type die cushion.

CONDENSED STANDARD SPECIFICATIONS

CAPACITY	STD. STROKE of slide	STROKES per minute	BED AREA	SLIDE AREA
75 tons	4	Flywheel 90 or 120 Geared 40	24 x 36	18 x 24
110 tons	5	Flywheel 80 or 105 Geared 37	27 x 42	21 x 28
150 tons	6	Flywheel 80 or 105 Geared 30	30 x 50	24 x 34
200 tons	8	Geared 28	34 x 58	28 x 36

Build a sound replacement program modernize with Minster Presses

MINSTER®

PRESSES

THE MINSTER MACHINE COMPANY, MINSTER, OHIO

• The top production rates designed into your machines are yours to profit by when you call upon Hans C. Bick for modern lubricants, coolants, and cutting fluids. Manufactured by specialists with 23 years' experience, these compounds are engineered for rigorous conditions such as high feeds, speeds and pressures. Furthermore, you'll like the friendly manner in which our engineers cooperate to solve the toughest problems. To get the most from your machines and tools, always call upon Hans C. Bick to smooth and cool the way.

Hans C. Bick, INC.

READING, PENNSYLVANIA

William P Drake, president of Pennsylvania Salt Manufacturing Co's Industrial Chemicals Division, has been appointed executive vice president of the company.

Samuel R Simpson, assistant vice president of Robertshaw-Fulton Controls Co, has retired after 35 years of service at the company's Bridgeport Thermostat Division.

F J Stokes Machine Co (Philadelphia) appointments: **J Gordon Seiter,** head of vacuum metallizing sales, to manager of the newly-established High Vacuum Division; **G Jewett Crites,** head of vacuum furnaces sales, to manager of the Vacuum Processing Division; **John F Maguire, Jr,** formerly with Lukens Steel Co, to manager of drum dryer and flaker sales; **Kendrick C Taylor,** sales, succeeds Mr Crites.

Theodore Z Herr has been appointed chief engineer of the American Welding & Manufacturing Co, Warren, Ohio. He was formerly chief engineer of the Building Products Division.

Elden T Davis, former vice president and controller of the Cleveland Chain & Mfg Co, has been named vice president and general manager of David Round & Son, Cleveland hoist manufacturer.

Fred L Amter, formerly tool sales engineer for Eastern Cutter Corp, Newark, NJ, has been named sales manager of Federal Carbide & Cutter Co, Rochelle Park, NJ.

H L Lawrence, works manager and superintendent of production materials and control, Hall-Scott Motors Co, Berkeley, Calif, has been named vice president of manufacturing. **Z P Loyd** has been appointed assistant to the vice president.

William H Foster, formerly manager of the gear jobbing division of W A Jones Foundry & Machine Co, Chicago, has been appointed general manager of Pittsburgh Gear Co, subsidiary of Brad Foote Gear Works, Inc

Roy D Palmer, formerly associated with the Aluminum Co of America, and Aluminum Ltd, has been appointed industrial consultant with Loewy-Hydropress, New York.

Dr Walter A Dean, chief metallurgist of Aluminum Co of America's Cleveland, Ohio, works, has been named to coordinate technological developments in titanium with the company's expanding activities in that field.

J D Rollins, assistant vice president, engineering, US Steel Corp, has been appointed vice president, engineering, of the organization's American Bridge Division.

Chrysler Corp's Dodge Division appointments: **Alfred L Gostow,** manager of the Forge plant, to divisional manager of methods; **Cecil N King,** associated with the automotive foundry products field, to manager of the Winfield Foundry plant.

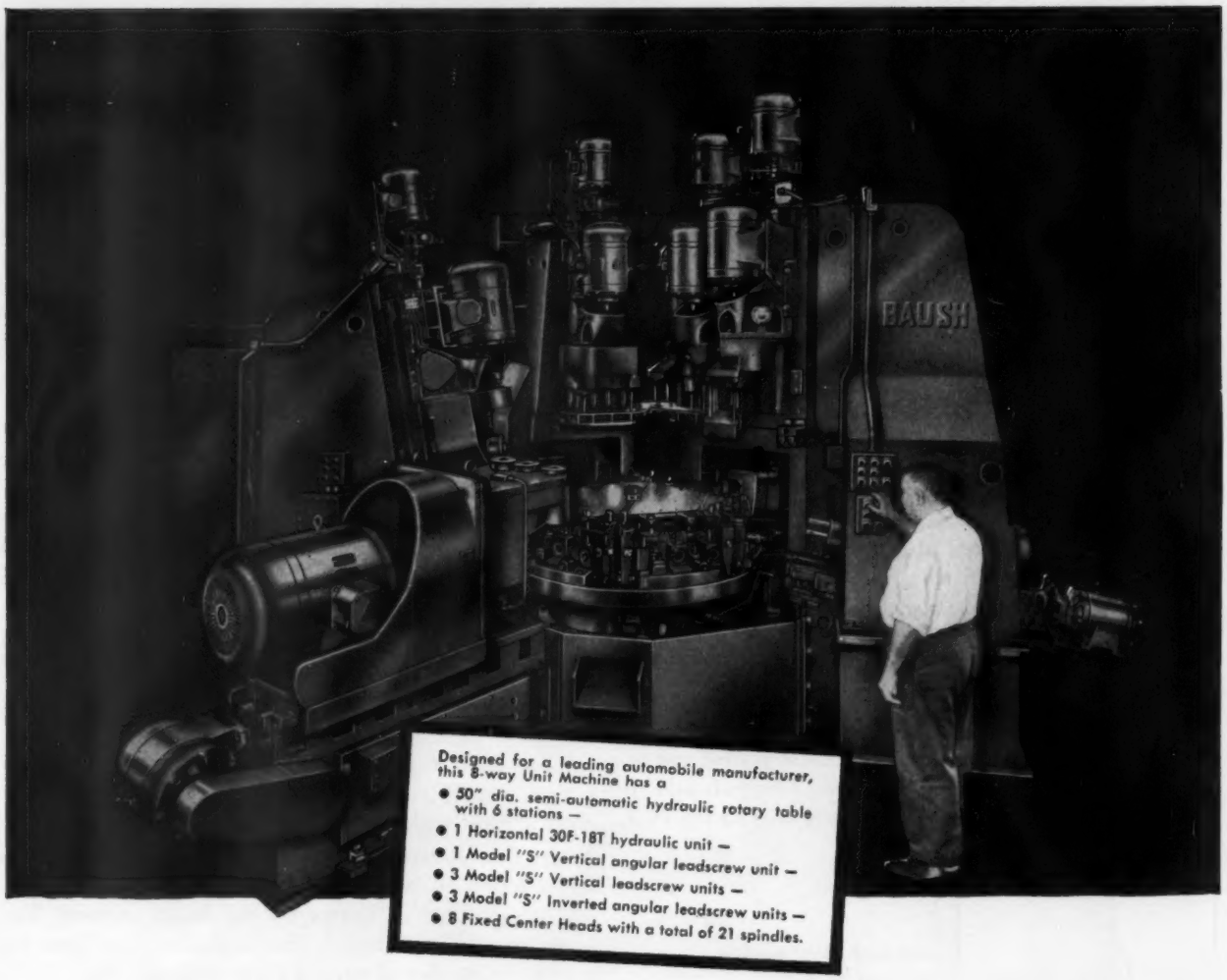
Edgar L Harden, formerly associated with Michigan State College, has been appointed secretary-treasurer of the Drop Forging Association. He succeeds **Raymond M Seabury,** who has retired after 20 years' service.

Executive appointments at Sterling Grinding Wheel Co of Tiffin, Ohio, and The Peninsular Grinding Wheel Division of Abrasive & Metal Products Co of Detroit: **Leslie B Bellamy,** general manager of Sterling Abrasives, to general manager of operations of Sterling Grinding Wheel Co; **Gilman F Farley,** works manager of the Sterling plant; **L V Dippell** and **John R Gregor,** managers of research and development for Sterling and Peninsular, respectively; **Harold E Erf,** manager of Sterling sales administration, and **O J Lautermilch,** manager of sales engineering.

Robert T Keller, vice president of Chrysler Corp, has been named to head West Coast automotive plant operations. He will make his headquarters at the Los Angeles plant which produces all four of the company's passenger cars

100 EXHAUST MANIFOLDS EVERY HOUR

with this 8-Way Unit Machine with Rotary Table



Designed for a leading automobile manufacturer, this 8-way Unit Machine has a

- 30" dia. semi-automatic hydraulic rotary table with 6 stations —
- 1 Horizontal 30F-18T hydraulic unit —
- 1 Model "S" Vertical angular leadscrew unit —
- 3 Model "S" Vertical leadscrew units —
- 3 Model "S" Inverted angular leadscrew units —
- 8 Fixed Center Heads with a total of 21 spindles.

It is this kind of trouble-free, accurate production that has been the background of BAUSH machine tools. You can't do better than rely on Baush — why not let our engineers work with you on your machining problems?

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

OPERATIONS: Mill mounting pads and exhaust pad — drill, coredrill, chamfer, ream and tap.

PRODUCTION: 100 exhaust manifolds per hour at 100% efficiency.

FIXTURE: Part sets into holding units in temporary location, and is hydraulically equalized, located and clamped from contours of bolt flange bosses. Hydraulically locked spring plungers give required support to offset tool thrusts. Hydraulic functions are controlled by hand valve at each station. Relief valves in operational cylinder supply line control sequence. All drilling and reaming stations have bushing plates that rest and register on holding units and slide on bars extending from heads. Hydraulic fluid power supplied from centrally located high pressure swivel. Chips shed towards outside of setup.

Advantages of Worm Gearing

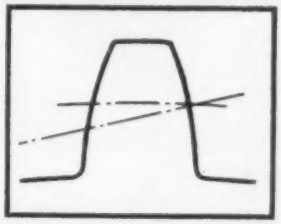
By J. E. GUTZWILLER

Assistant Chief Engineer, Worm Gearing Department

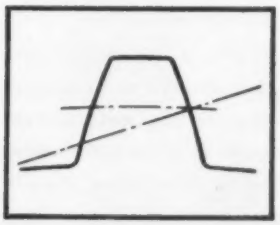
De Laval Steam Turbine Company

Interchangeability—The De Laval Steam Turbine Company was one of the first, if not the very first, manufacturer of heavy duty machinery to build worm gearing with interchangeable parts manufactured under limit gage control. Thus, worm and gear sets of like center distances but of different ratios can be readily interchanged if revision of speeds becomes necessary. Standard parts are always available for maintenance.

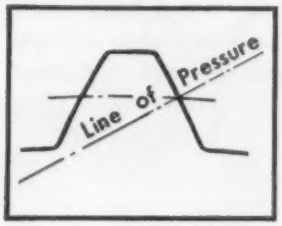
High Shock Load Capacity—The worm gear tooth form is such that the gear teeth are under a crushing, rather than a bending load. For this reason extremely high momentary and shock loads, damaging to many forms of gearing, can be successfully withstood. High momentary overloads seldom cause failure, as worm gear ratings are figured on the wear resistance of the gear teeth.



Standard 14½° involute spur gear tooth and old time worm tooth.



20° stub gear tooth.



De Laval Worm Gear Tooth. Note, line of pressure falls inside base of tooth.

Long Life—Bronze gear teeth maintain their correct form due to the regenerating action of the hardened steel worm, which retains its original shape throughout years of wear. A worm gear drive actually improves with service. This fact is peculiar to worm gearing and contributes to its recognized long life.

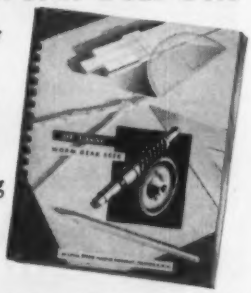
Smooth, Quiet Power—De Laval worm gearing transmits power by a continuous shockless action. Three or more teeth are in contact at all times, giving an even flow of torque and uniform angular velocity and eliminating vibration, pulsation, chatter and customary gear noises.

Compact Right Angle Drive—The use of worm gearing makes a neat, closely coupled, compact drive, with the motor shaft at right angles to that of the driven machine.

Larger Gear Ratios Simplify Design—Worm gearing offers larger ratios of speed reduction in a single compact set, another space-saving feature for the design engineer. The larger gear ratios obtainable in a single worm and gear set reduce the number of moving parts required.

Safety and Ease of Maintenance—The small number of moving parts in a worm gear drive may be readily enclosed, thus avoiding the hazard of exposed moving parts. Assuming proper lubrication, worm gearing operates with minimum attention, even under the most adverse conditions.

Reference Manual On Worm Gear Sets



Design engineers will find this new catalog a helpful working tool in the selection of worm gear sets. It contains examples of how to select worm gearings, worm and gear data, standard worm mounting dimensions, horsepower ratings, data on shaft stresses as well as other information.

Write on your business letterhead for Catalog 5000 to De Laval Steam Turbine Company, 887 Nottingham Way, Trenton 2, New Jersey.

DL 285

(Advertisement)

EXTRA RUGGED... SPEEDY... ACCURATE...

to Bring Down Milling Costs!

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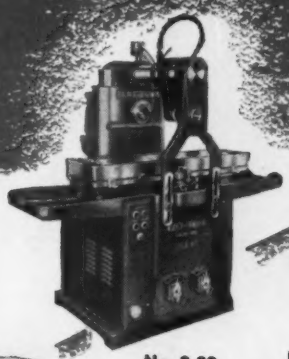
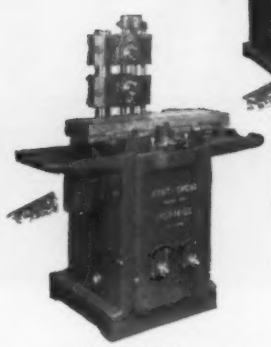
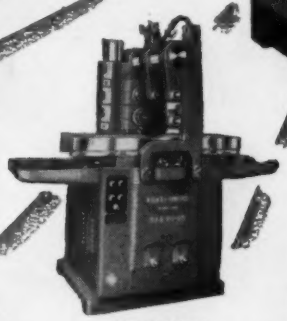
32" x 9" table ... 14" table travel ... hydraulic table feed ... full automatic cycle.



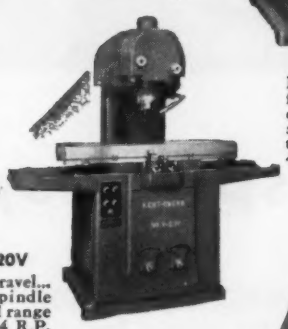
No. 2-20
20" table travel... 42" x 12" table.. fully automatic hydraulic table feed.



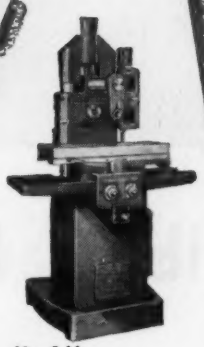
No. 1-14DS
Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.



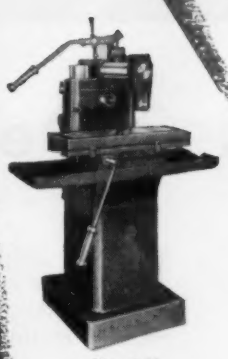
No. 2-20DS
Double Spindle for two milling operations at same time... 20" table travel ... 42" x 12" table.



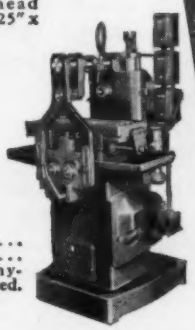
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.



No. 1-V
Hydraulic vertical head feed ... 5½" head travel ... 25" x 9" table.



No. 1-M
Hand feed to table and head ...25" x 9" table ... Adjustable head counterbalance.



No. 1-8
8" table travel... 25" x 9" table... automatic hydraulic table feed.

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Put the work on Kent-Owens Machines for top-speed milling and topmost accuracy to keep your costs at a minimum! Advanced features throughout these rugged machines make the difference . . . greater dependability . . . accuracy maintained in meeting tough production schedules. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to spindle. Write for bulletin #754 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, O.

KENT-OWENS
for milling machines

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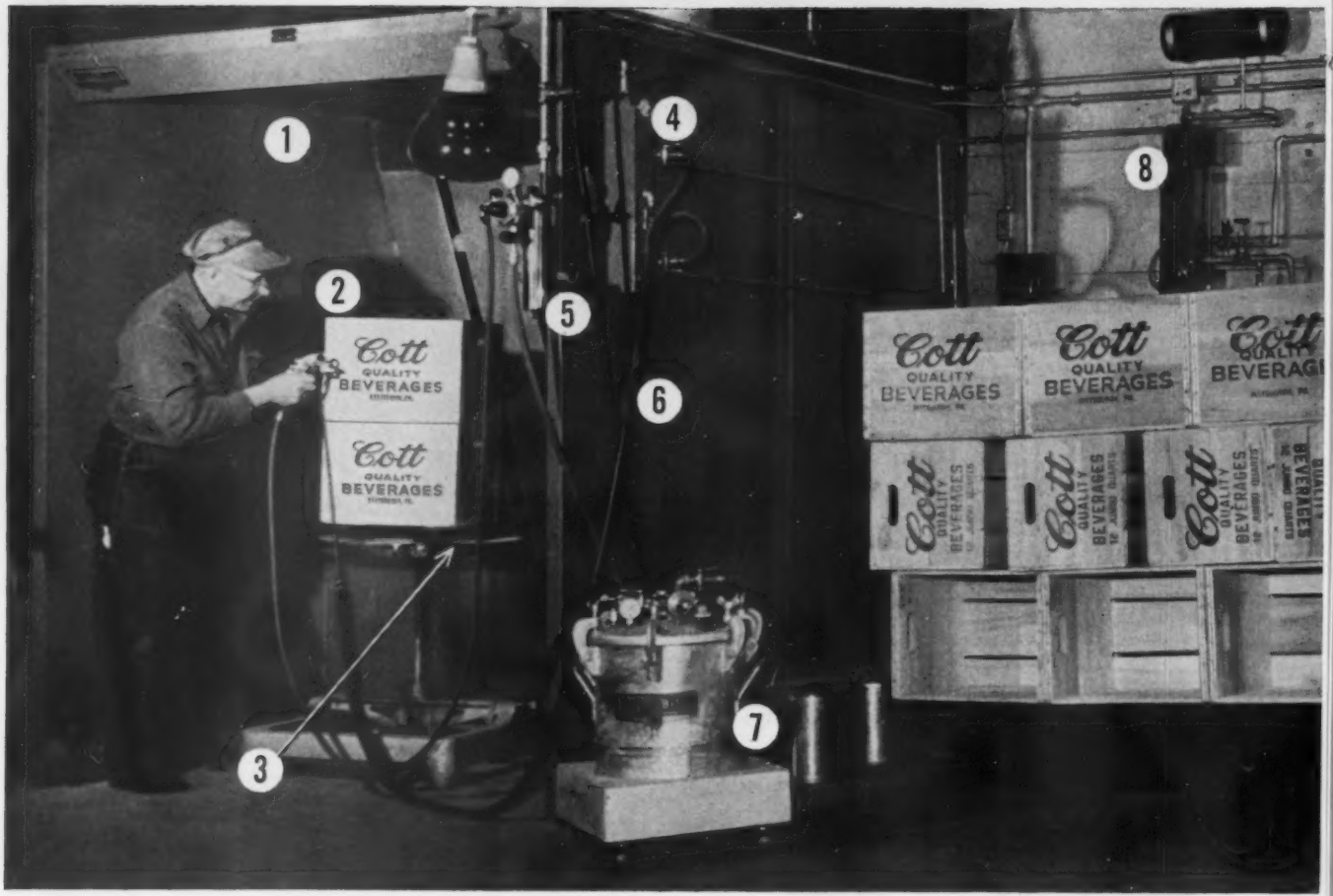


DeVilbiss hot-spray system is

BETTER finishes with fewer coats! Spectacular savings in time and material costs! Lower air and fluid pressures! Uniform material viscosity, regardless of room temperature!

Phenomenal benefits like these can be yours with a DeVilbiss paint-heating system, designed especially for industrial finishing.

Take the Standard Box Company, Pittsburgh, Pa., for example. Box makers for over 38 years, Standard had the problem of providing a protective coating on beverage cases – for longer life, better appearance.

Said Standard's president, Julius Sheps, "We used clear lacquer. For workability, the usual lacquer-thinner ratio of 1 to 4 was required. This meant three or four applications to give adequate protection to our boxes. Extensive thinner usage and multiple coats made costs prohibitive.

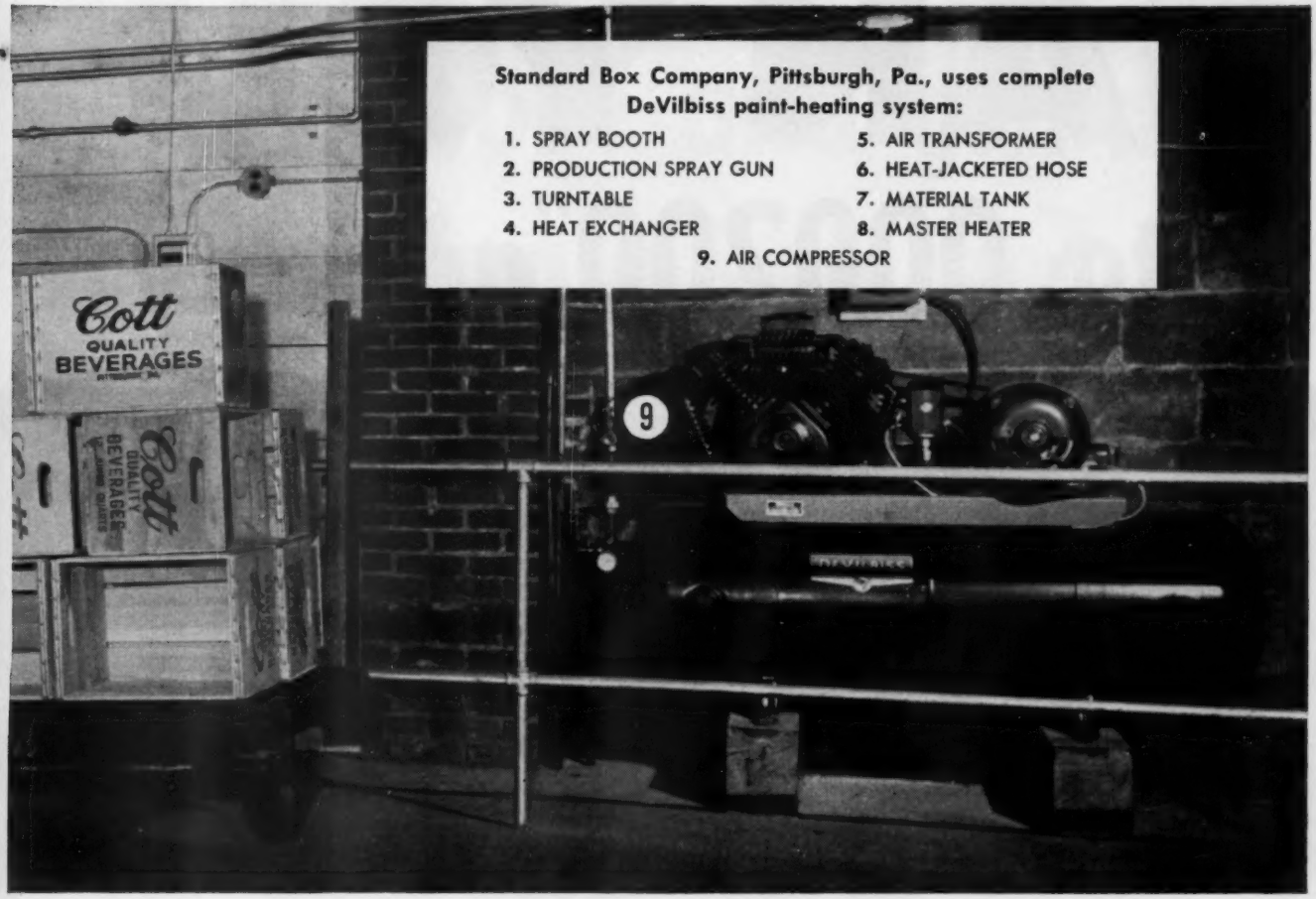
"We'd heard of DeVilbiss' new paint heater, and it turned out to be the perfect answer. With the DeVilbiss hot-spray system, we're now getting superior material flow, even spreading, better film build, better drying and a tack-free surface. The lacquer-thinner ratio is now reversed, providing four times as much solids per coat, saving on labor as well as thinner costs. We are not just satisfied with the results . . . we are delighted!"

Let a DeVilbiss representative help solve your finishing problems. The standard components of DeVilbiss' paint-heating system can be combined in countless ways to meet your special needs. There is but one source for complete hot-spray equipment, technical skill and responsibility that will improve your finishing operations – DeVilbiss.

THE DEVILBISS COMPANY

Toledo, Ohio

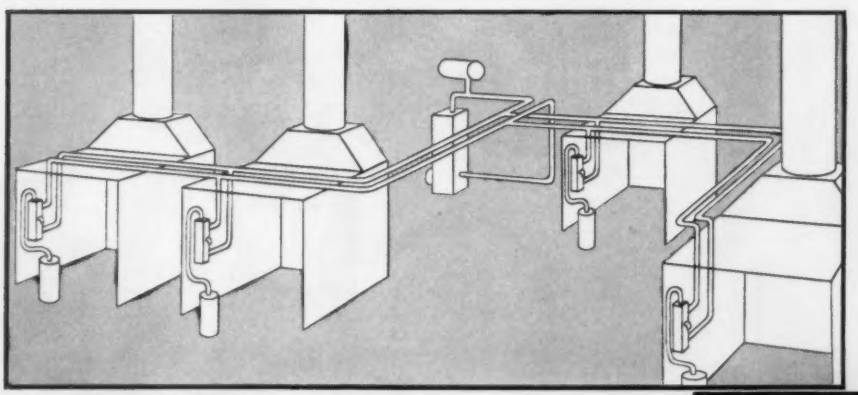
Santa Clara, Calif. • Barrie, Ontario
London, England



Standard Box Company, Pittsburgh, Pa., uses complete DeVilbiss paint-heating system:

1. SPRAY BOOTH
2. PRODUCTION SPRAY GUN
3. TURNTABLE
4. HEAT EXCHANGER
5. AIR TRANSFORMER
6. HEAT-JACKETED HOSE
7. MATERIAL TANK
8. MASTER HEATER
9. AIR COMPRESSOR

revolutionizing industrial finishing



Typical paint-heater installation, involving four spray stations. Single large-capacity master heater serves all four operators. Paint tanks at each station supply materials. Four operators can spray simultaneously. Consult your DeVilbiss representative for complete details.

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BRANCH OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES, CANADA AND THE WORLD

CAN YOU

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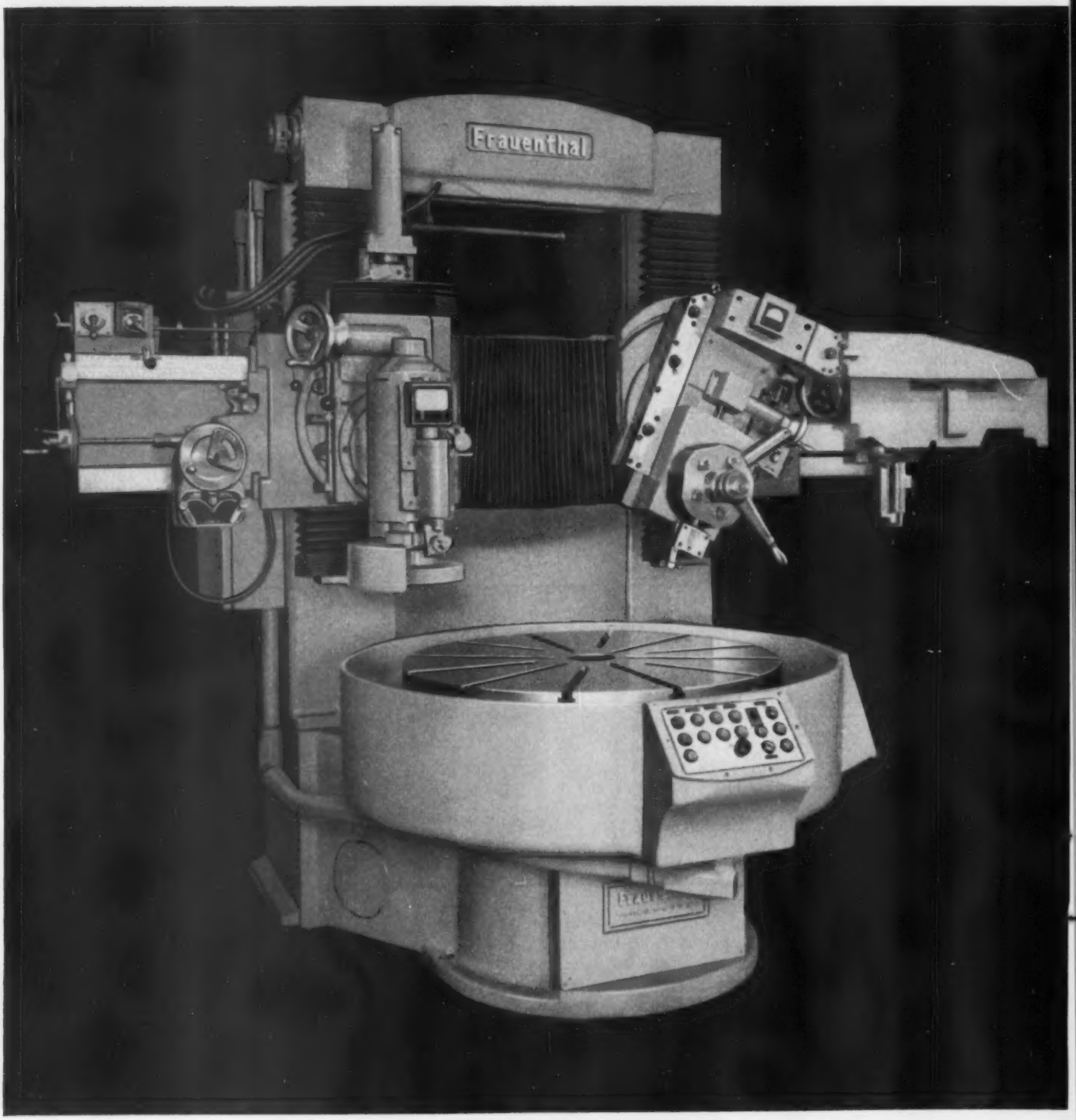


turn, bore and grind in a single set-up?

The Frauenthal 3100 Series offers this precision and versatility with these cost-cutting features

1. Utmost versatility — Both grinding compound and turret slide can be swiveled to meet practically any angular requirement.

2. Super-precision performance — Only a Frauenthal grinds related surfaces to accuracies within .000200″, producing consistently uniform precision in concentricity, parallelism and roundness.

3. Horizontal table — Loads easier and faster than vertical face plates. Horizontal table also provides greater stability for large, heavy parts.

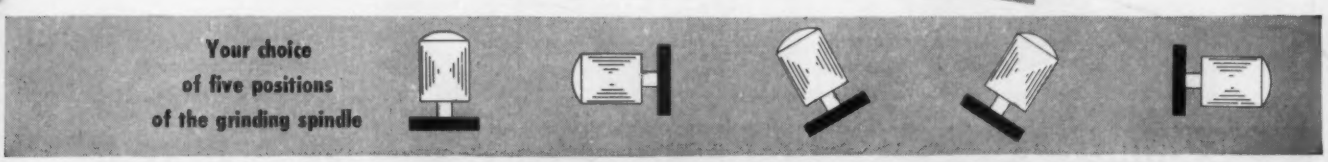
4. Simplified tooling — Horizontal table permits simpler fixtures, particularly for thin-section jet engine parts, plus economy of dual purpose tooling for turning and grinding.

5. Convenient controls — All operating controls are easily within the operator's reach for quick selection of feeds and speeds. Electrical interlocks are provided for utmost safety.

6. Contour turning — Hydraulic duplicator attachment (turning head) performs tracer controlled turning operations most accurately and performs repetitive operations at lower cost.

May we help you?

If you'd like further information on how the 3100 Series precision turning and grinding machine can give you production and/or tool room advantages — our engineers are at your service. Write for informative bulletin No. 301.



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ELCO SCREWS

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HERE'S A **Frame-up** TO GIVE YOU *MORE* FOR YOUR MONEY

These two new Star Hack Saw Frames provide convenience features and quality features found in no other frames.

NEW STAR No. 10

Green Tenite handle, one-piece, heat treated, solid steel back with long-wearing, rust-proof, crackle finish, and 12-inch Star Unbreakable Special Flexible Blade,

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EXAMPLE:

Blades are easily, instantly changed simply by moving the exclusive STAR cam-action lever under the handle.

EXAMPLE:

A quick, simple movement of the tension bar adjusts for 10-inch or 12-inch blades.

NEW STAR No. 15

Red Tenite handle, one-piece, heat treated solid steel back with smooth, high-gloss rustproof finish, with Star "Moly" High Speed Blade,

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STAR No. 20

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standard circular FORM TOOLS and BLANKS. Over 600 sizes carried in stock for IMMEDIATE DELIVERY.

It's no longer necessary or economical to "hand grind" tools or purchase "made to order" tools for short run jobs. Let SOMMA STANDARD CIRCULAR FORM TOOLS give you uniform, correct dimensions, better finish and appearance, less set-up trouble. In short—maximum production at the lowest cost.

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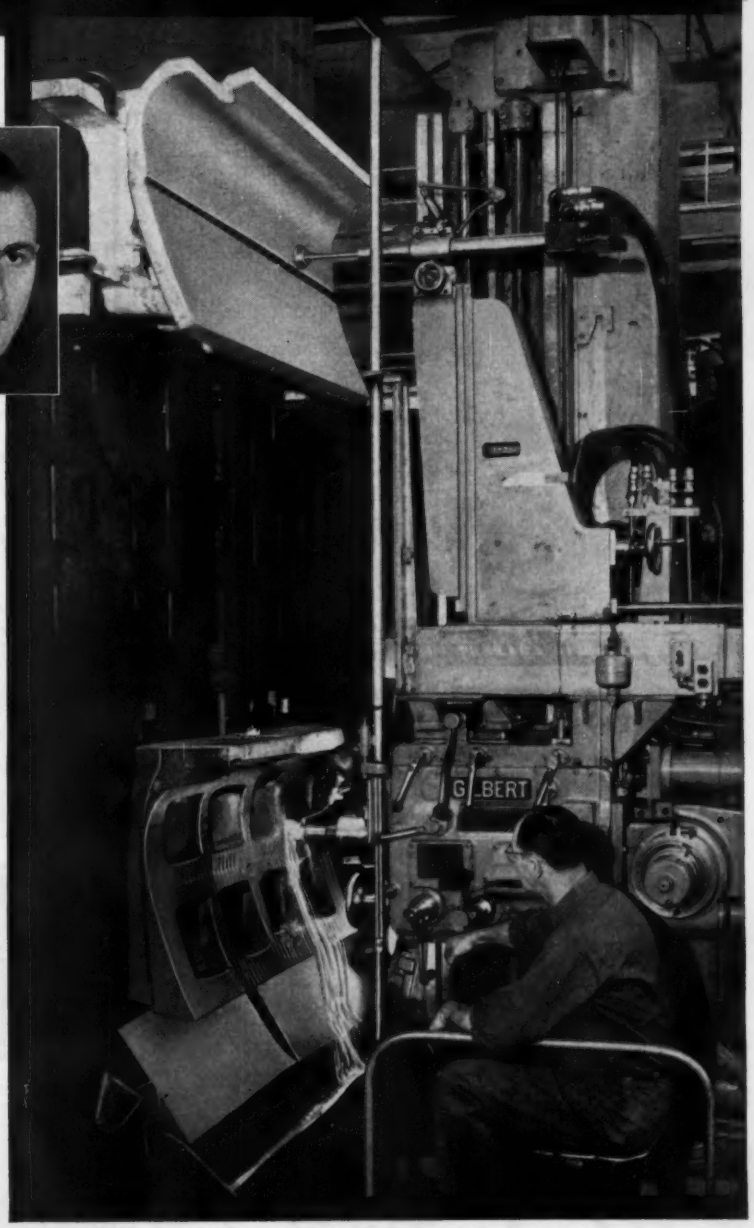
Plant engineer talks Turchan . . .



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Today we are doing a wide variety of contour milling faster, less expensively and equal to any other type of duplicating available."

Very truly yours,
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T. Gelemey
T. Gelemey
Plant Engineer

No human being can duplicate the exceptionally fast and accurate reproduction of a Turchan Follower Attachment.

Small machines or large can be equipped to handle work and the limitations . . . of production or precision . . . depend entirely upon the capacity of the machine involved . . . Finish can be greatly improved and shop capacity can be greatly increased.

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It takes the right machinery to build your product right! Columbus Die-Tool individually designs and builds tools, dies, and special machinery to produce your product alone. This gives you the advantages of lower operating cost, greater production and a higher quality product.

Let Columbus Die-Tool's more than 46 years of designing and engineering experience go to work for you. Contact CDT today about your special die, tool and machinery requirements.

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AND MACHINE COMPANY
P. O. BOX 750 • COLUMBUS, OHIO
ESTABLISHED 1906

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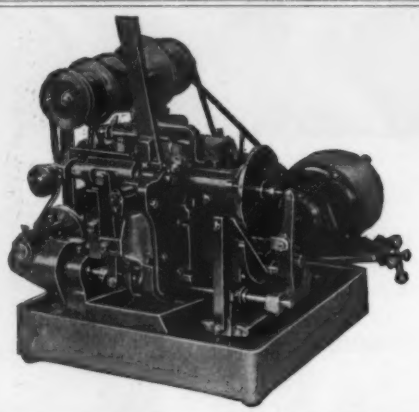
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

WALTHAM
PINION AND GEAR CUTTING MACHINES



Fast, Convenient, Compact, Accurate

Designed to make high speed production of small gears and pinions available for assembly in watches, instruments, gauges, fuses, etc. Made in Single-Cut, Multiple Cut and Magazine-Feed types. Simple to operate; require no special skill.

Send for detailed information and complete specifications.

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High Street, Waltham, Mass.

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A SPECIALIZED CAM MILLING SERVICE, SPOT AND BUTT WELDING, TURNTABLES, POSITIONERS FOR BRAZING, SPRAYING, WELDING, SOLDERING OVER 100 TYPES CONTRACT PRODUCTION, SPECIAL AUTOMATIC MACHINES.

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LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

NEW!

HOLCROFT'S BANTAM-SIZED BATCH FURNACE

Featuring A 500 LB/HR CAPACITY

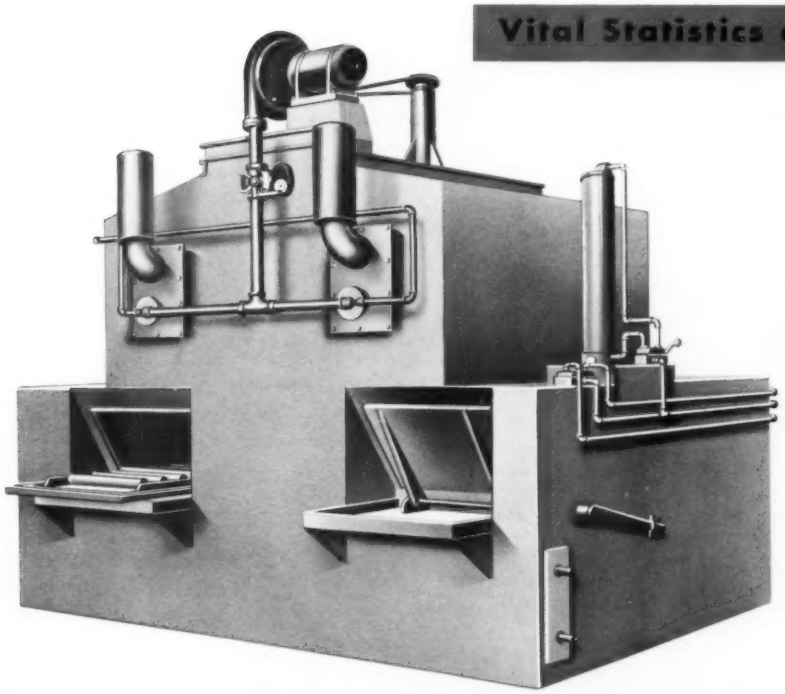
Holcroft's new bantam-sized batch furnace for controlled atmosphere heat treating does a king-sized job at a low, low cost. An entirely new concept of batch operation, the furnace offers new opportunities not only for small plants, but for large ones which have limited or varied production problems. The new batch furnace offers the same engineering know how and quality that has made Holcroft the leader in heat treat development.

It can be adapted to run such typical cycles as: carburizing; carbonitriding; clean, neutral and bright hardening; carbon restoration; normalizing; annealing; tempering and non-ferrous heat treating.

Operation is simple—only two valves are involved. When the stock has completed its time in the furnace chamber it is lowered by an elevator, transferred into position for quenching, and lowered into the quench oil. Simultaneously, a previously-loaded tray of cold work moves onto the charge elevator and then up into the furnace chamber. The operator may remove the quenched stock from the discharge door or load the furnace through the charge door at any time during the heating cycle.

Quenching is fast and there is no loss of heating time loading or unloading. This arrangement reduces atmosphere gas requirements because vestibule flushing takes place while the stock is being heated.

An important feature of the new furnace is its small floor space requirement. No pits are needed; the heat source is above the vestibule—improving working conditions.



Vital Statistics of HOLCROFT'S NEW FURNACE

1. ***Capacity***—can heat 500 lbs. gross per hour to 1500°F. Flexible enough to be operated at temperatures ranging from 400° to 1800° F.

2. ***Dimensions***—9′ 3″ x 6′ 9″ x 10′ 6″ high.

3. ***Tray size***—two 24″ x 18″ pinned sections with basket on each section for loading 9″ high.

4. ***Operation***—three pneumatic cylinders controlled by two hand-operated valves. Can be made completely automatic.

5. ***Quench tank***—completely enclosed with built-in cooling. Hot oil optional.

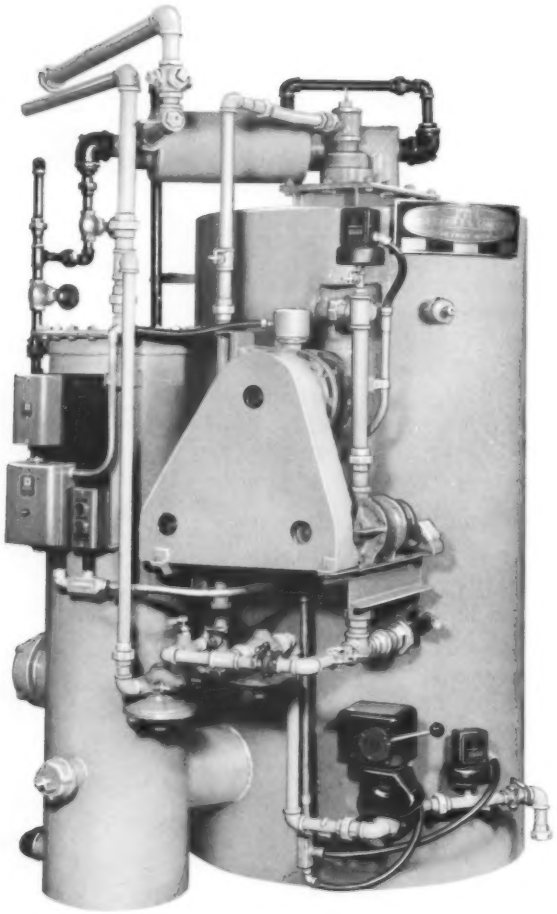
6. ***Fan and Pump***—same size as on Holcroft's big batch furnace. Variable controlled oil flow.

7. ***Doors***—hinged at the bottom with operating lever at the side of furnace for greater safety.

SEE OTHER SIDE

Another FIRST!

HOLCROFT'S NEW EXO-ENDO GAS GENERATOR



Holcroft has designed a radically-different exo-endothermic gas generator. Designed not only for the batch furnace but for other furnaces as well, the generator can produce gas atmospheres between the limits of perfect combustion and modified "302." At the latter setting, the gas generated has two main differences from a standard AGA Type 302 gas. The first is very much lower dewpoints—as low as minus 50 deg. F. with no detectable amounts of methane. In addition, the gas produced has an approximate 50% lower hydrogen content. This means that for a given carburizing potential, less hydrocarbon addition is necessary. The lower percentage of hydrogen is an added safety feature.

The Holcroft process is covered by U. S. patent No. 2,589,810.

A slight adjustment at the generator can produce a non-explosive atmosphere to perform heat treating cycles below the explosive limits required for atmosphere tempering, annealing, and stress relief of ferrous alloys as well as hardening, annealing and tempering of non-ferrous alloys.

The new generator is an extremely compact unit (but 20 square feet of floor space is required.) The total gas used can be adapted to many manufacturing requirements.

If you have any kind of a heat treat problem—small or large—better call Holcroft.

SINCE 1916

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

Holcroft AND COMPANY

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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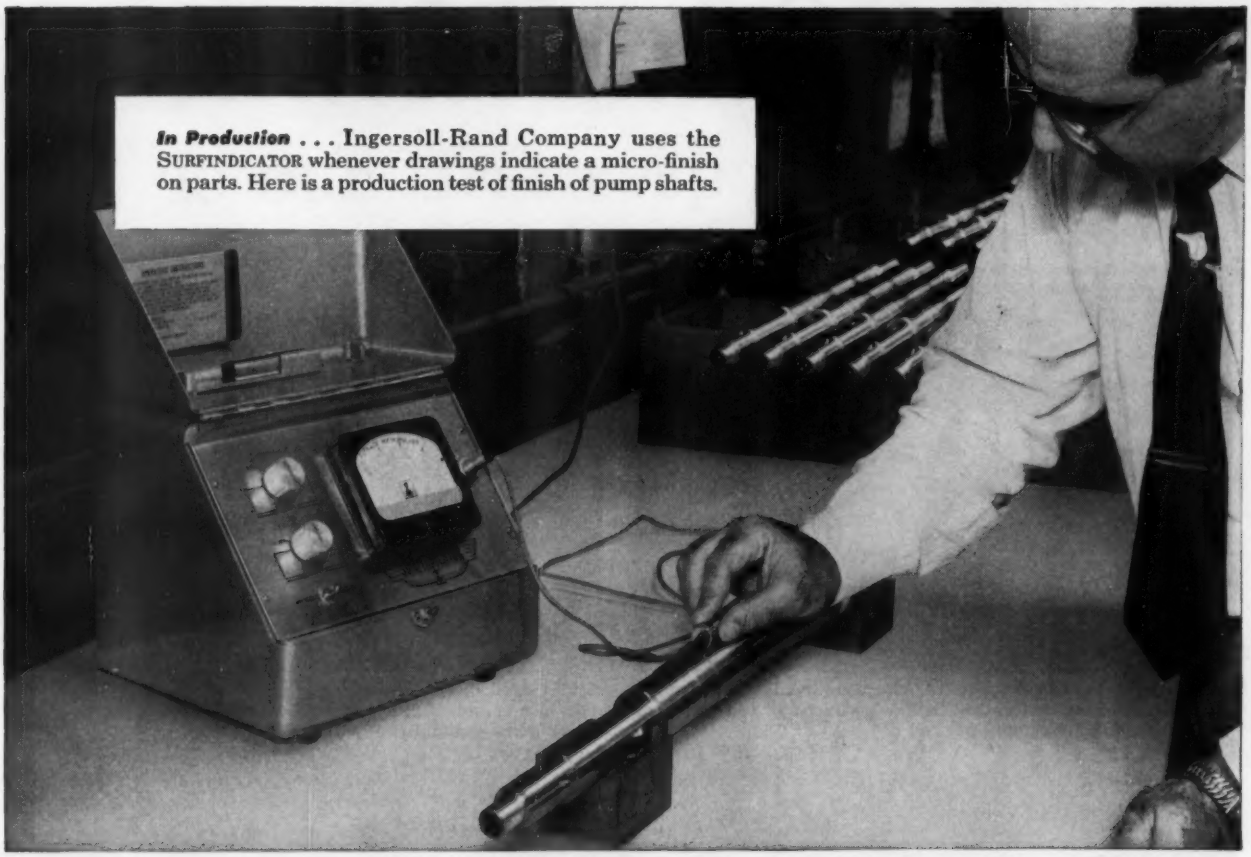
LITHO IN U.S.A. 86.5M DO 2-55

SEE OTHER SIDE



In Production . . . Ingersoll-Rand Company uses the SURFINDICATOR whenever drawings indicate a micro-finish on parts. Here is a production test of finish of pump shafts.

SURFINDICATOR* QUICKLY PAYS FOR ITSELF

through better surface finish control

THIS MODESTLY PRICED instrument permits you to measure surface roughness quickly, easily, surely—*in the shop.* With simple checks of surface finish you can:

- . . . **speed up inspection, avoiding costly delays and arguments.**
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The SURFINDICATOR is portable, can be calibrated on the spot, can be operated by anyone. Surface roughness in microinches is indicated directly on the meter. The SURFINDICATOR quickly pays for itself and helps you operate more efficiently. Send coupon today for complete information. *Trade-Mark

In Development . . . Behr-Manning's laboratory evaluates coated abrasives by checking finish on test parts. Company reports, "SURFINDICATOR has been most satisfactory"

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☐ Have your nearest representative demonstrate the SURFINDICATOR to me.

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LITHO IN U.S.A. 66-5M DO 2-55

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CANADA: Walker Metal Products, Ltd., Windsor, Ontario • EUROPE: S.O.F.I.M., Paris 8, France

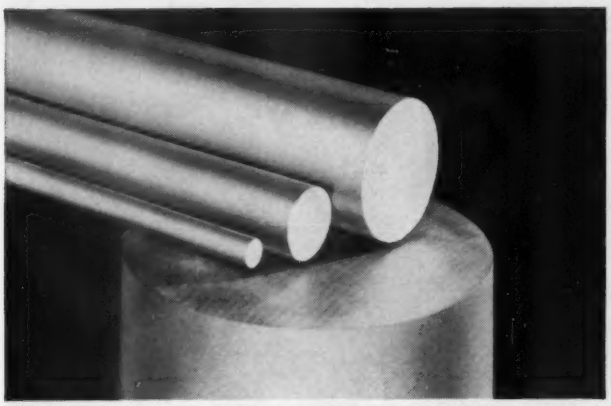
Aluminum of

EXTRUDED SHAPES All standard alloys are available in custom shapes (solid, semi-hollow and hollow), structural, rod and bar, and in extruded tube and pipe.

SHEET AND PLATE Supplied as flat sheet, plate, coil sheet, circles in a complete range of alloys, sizes and tempers. Specialty sheet items available on inquiry.

WIRE Supplied as round or hexagonal drawn wire. Also rivet, welding, screening, EC and redraw wire.

Dependable Quality
is our first responsibility



ROD AND BAR Available in a wide range of alloys in rolled and cold finished rod and bar, round and hexagonal standard screw machine stock, hexagonal bar, redraw bar, rivet rod and round forging stock, square and rectangular bar.

PIG, INGOT AND BILLETS Kaiser Aluminum produces Pig, Ingot and Extrusion Billets in a range of alloys and sizes to meet your specific requirements.

WE BELIEVE that one reason why so many manufacturers choose Kaiser Aluminum is *dependable quality*.

We consider this our major responsibility—to see that every shipment we make arrives in the exact form, shape, size and chemical composition which will best serve the manufacturer's needs.

We take many steps to assure the high quality of Kaiser Aluminum.

We maintain one of the most modern and best-equipped research and development laboratories in the industry.

Physical tests are constantly conducted to check the quality of the aluminum, and also to determine if a different alloy or technique would do a better job at lower cost.

A system of rigid and continuous inspection assures that customer specifications are met exactly.

When desired, and at no cost to you, our field engineers will give you machine-side assistance in obtaining the highest quality possible from your equipment.

We believe we are ideally equipped to work with you because our efforts are put behind the job of serving manufacturers—to help improve their products and reduce costs.

For complete information, call or write any Kaiser Aluminum sales office or one of our many distributors, located in principal cities. See our catalog in Sweet's Product Design File or write for copy. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois. *Executive Office*, Kaiser Bldg., Oakland 12, California.

Other Kaiser Aluminum products include: industrial foil, and electrical conductor. Kaiser Aluminum also supplies household, freezer and broiler foil for home uses; Shade Screening for the building industry, and roofing and siding sheet for farm and industrial buildings.

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containing 24 pages of valuable information on all Kaiser Aluminum Products.

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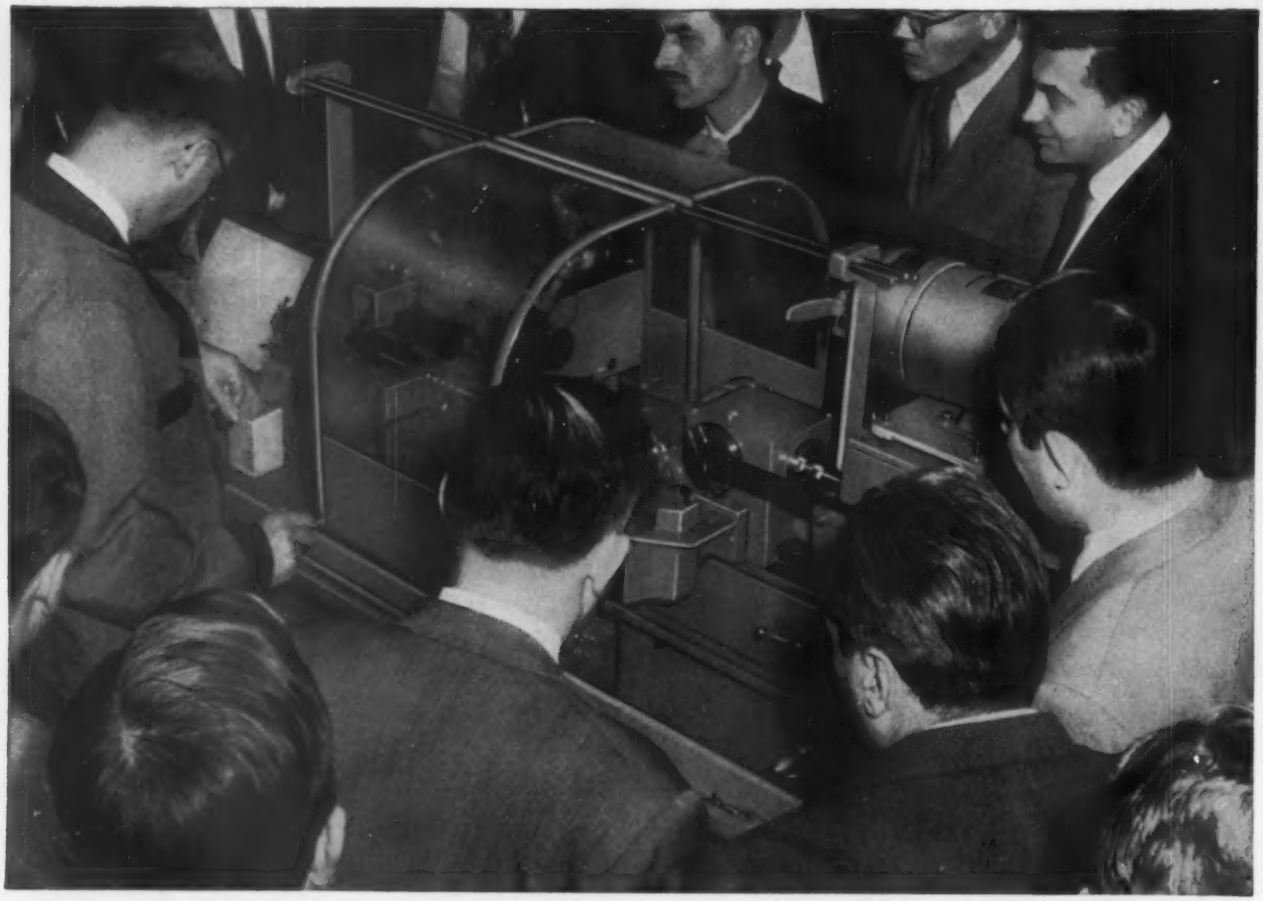
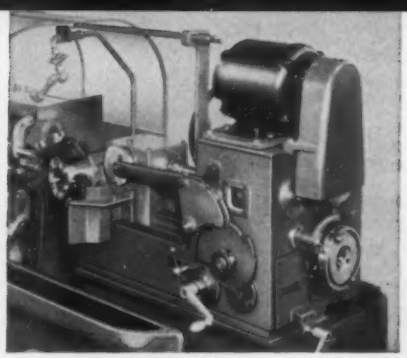


This photo was taken in late February in Chicago at the first showing of the Detroit Screwmatic 750—the greatest real advancement in single spindle screw machine design and performance in 20 years. Put yourself in this picture at *your* dealers . . . and you, too, will see a demonstration of lowered costs and increased production.

Just 6 of the Detroit ScrewMatic features that

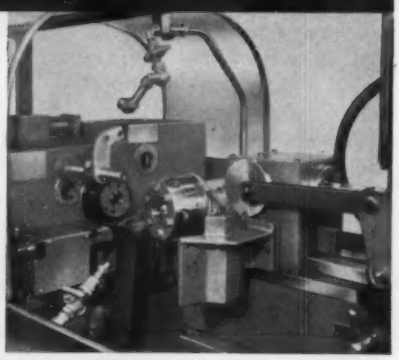
HIGH PRODUCTION

Screwmatic's heavy-duty, five horsepower motor and advanced spindle design permit speeds sufficient to machine all types of materials with carbide tools. Spindle speeds are infinitely variable and three different forward speeds may be employed during any cycle of work. All speeds are reversible, thereby eliminating need for left-hand tools.



VERSATILITY

Slideable turret unit increases work length capacity by several inches. The turret unit may be positioned away from the spindle without crowding toward tools. A three position crank permits long, medium, and short work to be produced with equal efficiency.



PRECISION

Staying accuracy of closest tolerances in forming is assured by Screwmatic's heavy section cross slides and direct cam activation. Six position turret is provided for end working tools. The machine is provided with a short stubby spindle mounted in precision non-adjustable, anti-friction bearings. These bearings carry no belt load.

IF YOU HAVEN'T BEEN IN A GROUP LIKE THIS...

you don't have the last word on the latest in screw machine performance

Single Spindle . . . High Speed

Takes .750" O.D. Bar Stock

Heavy-duty Capacity

DETROIT Screwmatic 750

SEE IT DEMONSTRATED NOW AT YOUR DEALER'S

Send for more information. Write for name of nearest dealer.

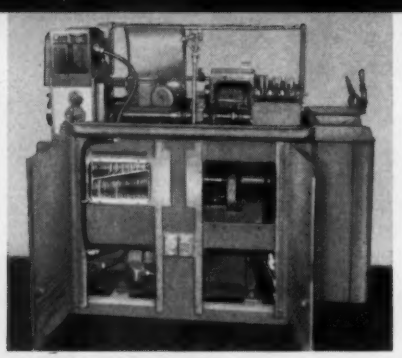
A product of **THE GEAR GRINDING MACHINE COMPANY**

3919 CHRISTOPHER • DETROIT 11, MICHIGAN

will increase your profits . . . decrease your costs

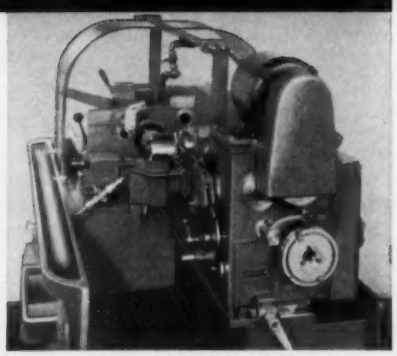
EASY SET UP

Retooling for a new job is quickly and easily accomplished. The fully visible, easily accessible lead cam does not require "cut downs" in normal operation. Tool and cam layout computations are greatly simplified by the Screwmatic's open front, high wall cabinet, immediate tool accessibility, and large tooling space. Standard tools, cams, and collets are used throughout the machine.



ACCESSIBILITY

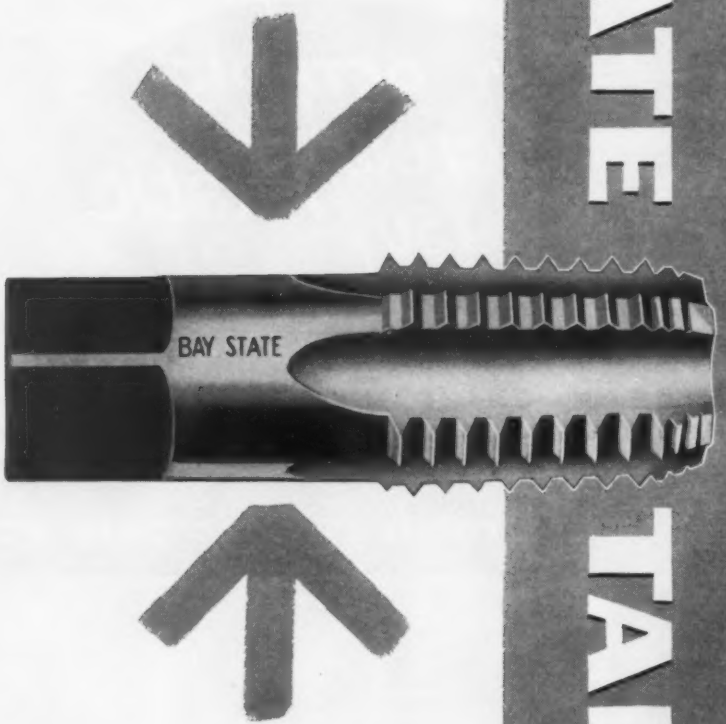
Open back view of the Detroit Screwmatic 750 shows the quick accessibility of cycle time gearing. At the right hand side of the photograph you can see the automatic lubrication and coolant pump drive. Above is the platform which allows attachments to be easily mounted.



LESS DOWN TIME

Down time to clean chip well is eliminated. Work chips flow into a large, deep chip well with an open end. This provision permits chips to be removed from the machine during actual operation. The high wall design provides oil splash protection for the operator. (Note handy parts receiver.) The overload safety throw-out is immediately accessible at the end of unit.

BAY STATE TAPS



TAPS FOR PRODUCTION . . . in all standard and special sizes . . . are available from your nearby Bay State Tap distributor. You will gain precision performance on every tapping job with controlled contour taps, made by BAY STATE TAP & DIE CO., MANSFIELD, MASS.

How to Pick the Right Cutting Oil

WORD OF MOUTH?
It gives you the answer sometimes, but not many of your friends have the same cutting oil requirements and the same problems that you have. It's much surer to depend on specialists like Sun.

LABORATORY ANALYSIS?
Sure. But there's no formula for correlating the laboratory analysis with how well the cutting oil will work on your job. It takes years of field experience like Sun's to help you make the right choice.

ELABORATE SHOP TEST?
This will probably give you the answer. But it's expensive and interferes with production when you try to test all the oils available. Sun's experience can help keep your shop-testing to a minimum.

EXPERIENCE IS THE ANSWER.
And Sun has it. Its field representatives have probably come across problems similar to yours many times. If they haven't, its cutting oil specialists and metallurgical technicians are ready to help with your problem.

Soluble or straight, transparent or black, light or heavy duty—Sun makes the kind of cutting oil you need to handle your job at the lowest cost. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-3.

INDUSTRIAL PRODUCTS DEPARTMENT

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Refiners of famous High-Test Blue Sunoco Gasoline

Photo courtesy Deluxe Cutter Grinding Company

Builds profitable business with six COVEL CUTTER AND TOOL GRINDERS

Above: Grinding cutting edge on 6" face mill, at DeLuxe Cutter Grinding Company, using fine wheel to produce smooth finish. Other typical operations include making special tools from standard tools, sharpening face mills, end mills and a wide variety of other tools.

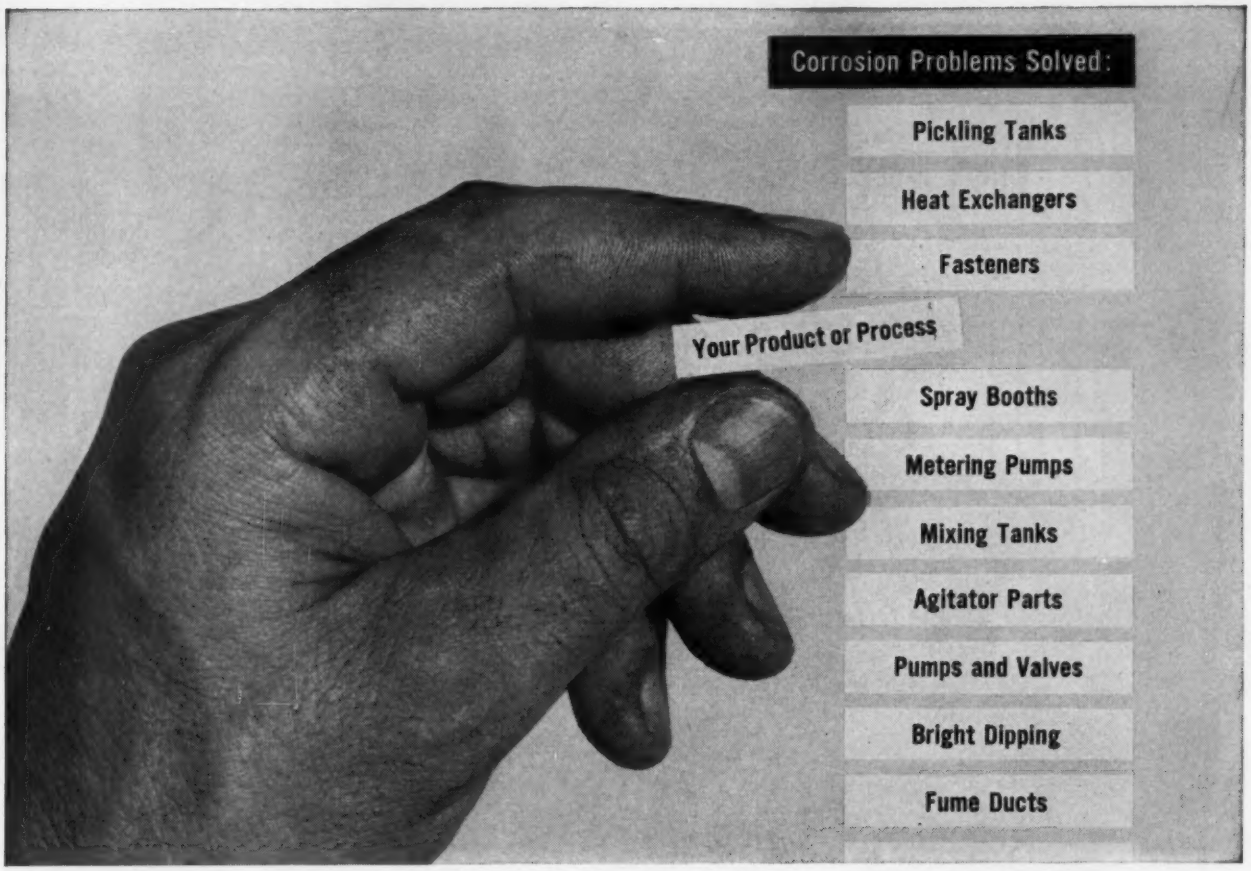
Get full particulars— send for Bulletin AM-35

DELUXE CUTTER GRINDING COMPANY, DETROIT, has an enviable reputation for service—*fast* service—in the highly competitive business of sharpening and salvaging tools and making special tools—thanks to its Covel Cutter and Tool Grinders. Its first Covel, put into operation eight years ago, proved so fast, accurate and dependable that DeLuxe Cutter Grinding Company now has six Covels busy meeting a constantly growing demand. No major repairs have ever been necessary, no spindles have had to be replaced.

This is another of the many examples of how Covel Cutter and Tool Grinders can improve *your* competitive position, *too*—whether you grind tools for others or for your own use. So, why not standardize on Covels? You'll be money ahead!

COVEL PRECISION GRINDERS | **BENTON HARBOR MICHIGAN**

HYDRAULIC & HAND FEED SURFACE GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS

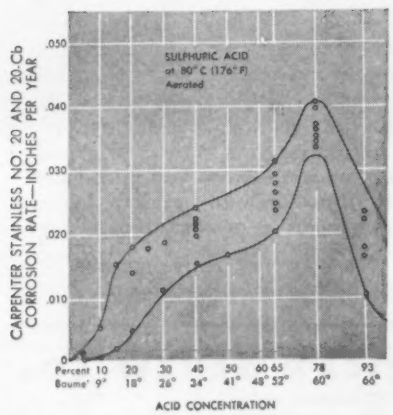


When will you add *yours* to the list?

How *sure* are you that your troublesome corrosion problems can't be licked? We've helped to solve a lot of "toughies", and we'd like to help you with yours. For example, one plant had a problem with Stainless Type 316 tie rods exposed to a solution of sulphuric acid ranging from 0% to 58%. Temperature: 158°F. (70°C.). After changing to Carpenter *Stainless No. 20*, life of the rods increased from 4 days to 256, and the *No. 20* rods still don't show any signs of corrosion. This is just one job report of many that shows what happens when plants change from ordinary stainless steels to Carpenter *Stainless No. 20*.

There is no other stainless on the market quite like *Stainless No. 20*. It was developed after seven years' research in Carpenter laboratories. It combines good workability with super resistance to many types of hard-to-handle acids (including sulphuric) at high operating temperatures. And in the short time it has been available, *No. 20* has added months, sometimes *years*, to the life of equipment such as mixing tanks, heat exchangers, process piping, pump and valve parts, bolts, nuts, tie rods, pickling racks, etc.

Here is your opportunity to realize *new* freedom from corrosion headaches. Tell your Carpenter representative you want to see the new No. 20 Comparative Corrosion Kit containing proof of super corrosion resistance. Or, to get started in testing No. 20 now, drop us a line for test coupons. THE CARPENTER STEEL CO., 109 W. Bern St., Reading, Pa.



Carpenter Stainless No. 20-Cb is available from The Carpenter Steel Company, Alloy Tube Division, Union, New Jersey, in the forms of tubing, sheet, strip, pipe and plate; and Stainless No. 20 in the forms of bars, billets and wire. In addition, many other No. 20 fabricated parts are available from various manufacturers. Write us for their names.

Carpenter STEEL — Stainless No. 20

Pioneering in Improved Tool, Alloy and Stainless Steels Through Continuing Research

Export Department: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"

Naturally...
American Phillips Screws
Cost More...BUT only
'til you put them
to Work!
UNITED STATES OF AMERICA
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HALF DOLLAR
The million-dollar question is not whether you can afford to use American Phillips Screws . . . but whether you can afford not to use them. For when American Phillips fourfold savings take hold in your assembly departments . . . easier handling, faster driving, tighter fastenings, safer work conditions . . . then you have the lowest-cost operation you can get by any fastening method (as much as 50% below present costs).
American has set up startling economies in some highly unlikely places, by applying the know-how gained during the years since American first introduced the Phillips Screw to industry. Let us economy-test your operations. Write:
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. . . the mark of extra quality
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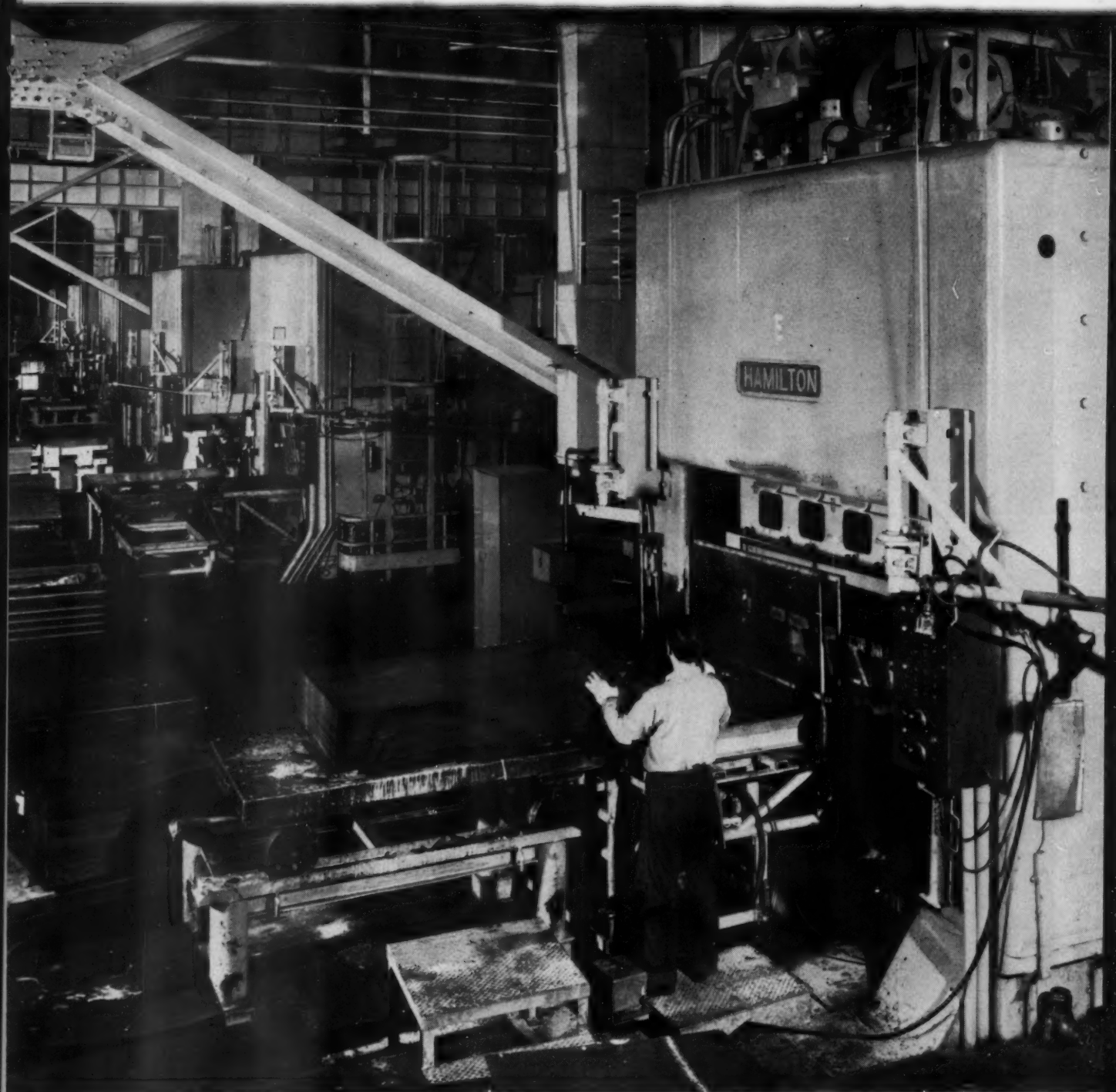
PHILLIPS HEADquarters
WILLIMANTIC, CONNECTICUT
Plants at Willimantic, Conn. and at Norristown, Pa.
Warehouse and office at Chicago
Office, Detroit, Michigan



EVIDENCE OF LEADERSHIP—Hamilton presses head each of these lines in a typical modern auto-body stamping plant. In most other major plants in this industry you can see similar evidence of Hamilton's 30-year leadership in design, quality and performance. *Hamilton Press Division, 425 Curtis Building, Detroit 2, Mich. Branch Offices: New York and Chicago; Factory: Hamilton, Ohio.*

BALDWIN · BLH · LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON

Alvin I. Handmacher, President of Handmacher-Vogel, Inc., says

He knows how to suit the women!

"When a woman sees a style she wants, she wants it *fast,*" says Mr. Handmacher. "In fact, she wants it first!

"And we see that she gets it — in *her* size and color. How do we do it? By Air Express!

"We push our production schedules to meet insistent buyers' re-orders. Then we rely on Air Express to deliver door to door in record time.

"Without Air Express, we'd never suit women as well as we do!

"Air Express pays off in two ways. It wins us customer good will and saves us money! For instance, it costs $4.10 for a ten-pound shipment from New York to Louisville—$1.64 less than by the next lowest-priced air service."

It pays to express yourself clearly. Say Air Express!

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*

CALL AIR EXPRESS . . . *division of* RAILWAY EXPRESS AGENCY

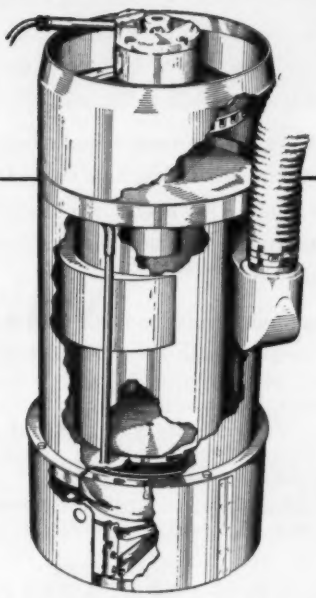
The All New DUSTSNAIRE

Easy to operate — no parts to wear — no bags to change or clean

Compact — takes only 4 sq. ft. floor space — easily portable

100% efficient at all times — no efficiency drop

for "STAR" DUST EXHAUSTER Performance



Guaranteed to remove all particles 5 microns or larger, having a specific gravity of more than 1.5

Abrasive offers to all users of grinding machines for the first time the Feifel DUSTSNAIRE — the scientific answer to the grinding dust problem. May we send you details on this compact, dependable unit? Write for DUSTSNAIRE catalog. Abrasive Machine Tool Company, 8 Dunnellen Road, East Providence 14, Rhode Island.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Co., Inc., 738 Union Ave., Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Precision Rotary Tables, Motorized Centers and a complete line of Hole Location Accessories.

7 Tricks of the Trade in Jig Grinding Small Holes

The following tricks of the trade will prove helpful in jig grinding small holes with a diamond-charged mandrel:

1. Uniformly graded diamond powder should be used for charging mandrels. Holes from minimum (1/64″) to about 3/32″ in diameter should be roughed and finished with 80-100 grit powder. Larger holes may be roughed somewhat more rapidly with a coarser grade, 60-80 grit.

2. Avoid bellmouth by preventing the mandrel from leaving the hole at either end.

3. Since a freshly charged mandrel will cut much more rapidly than a worn one, avoid introducing a freshly charged tool as a hole nears size, Fig. 1.

4. Do not permit the uncharged *shank* of a mandrel to contact the surface being ground. Frictional heat will burn both the work and the mandrel. The former, partially annealed at point of such contact, will charge with diamond sut and probably be ruined.

5. It is generally more economical and efficient to consider mandrels as expendable and make a new one for each job. Since the cost is only a few cents, use of an old one, or even the time spent trying to match one to requirements, is hardly justified.

6. Because mandrels cannot be trued with a diamond, it is necessary to measure both the top and bottom of a hole while grinding, in order to avoid a ridge.

7. In view of point 6, it is advisable to set the work up on parallels of sufficient height to enable measurement from beneath the workpiece, Fig. 2.

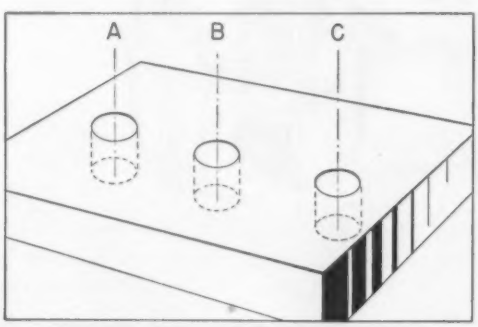
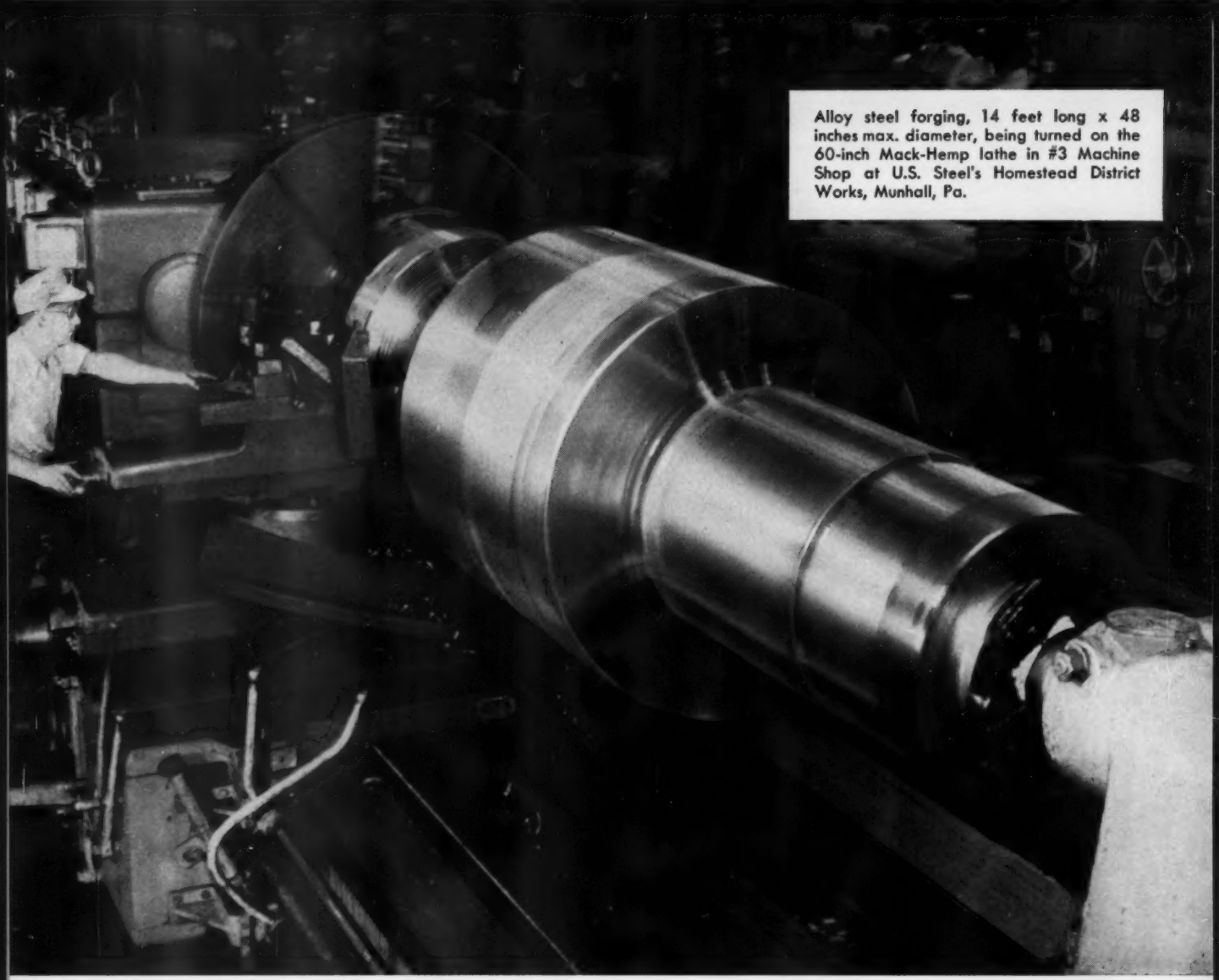


Fig. 1. In grinding three holes to size, A and B are roughed to within .001″—.002″, and C within about .005″. Using a freshly charged mandrel, C is finished to size, thereby breaking down the high points on the tool. A and B may now be safely ground to size.

Fig. 2. Workpiece is mounted high enough to permit measuring bottom as well as top of hole.

Get ALL the answers from this new, 424-page book

The information on this page is just a sample of the valuable, on-the-job aid you can get from Moore's *all-new* book, HOLES, CONTOURS AND SURFACES. Tells you how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Price only $5 in U.S.A., $6 elsewhere. Send check or money order to Moore Special Tool Co., Inc., 738 Union Ave., Bridgeport 7, Conn.



Alloy steel forging, 14 feet long x 48 inches max. diameter, being turned on the 60-inch Mack-Hemp lathe in #3 Machine Shop at U.S. Steel's Homestead District Works, Munhall, Pa.

On the job 11 years! At work 24 hours a day!

It's actually more than eleven years since this Mack-Hemp lathe went to work for U. S. Steel Corporation. During those eleven years it has been in operation almost continuously, 24 hours a day.

The service record of this particular lathe is impressive for still another reason than the more than 90,000 hours of work it has performed. Since it was built, the growth of tungsten carbide tooling has placed additional loads on all heavy-duty engine lathes.

The operating conditions on the product being machined demonstrate how this Mack-Hemp lathe stands up under the heavier demands placed on it—

- **Forging—nickel—chrome—molybdenum steel**
- **Lathe Speed—22 R.P.M.**
- **Feed Speed—1/16 inch per revolution**
- **Cut—½ inch deep**
- **Tool—Kennametal tungsten carbide**

There are three Mack-Hemp engine lathes in this machine shop—all proving daily that these lathes can take it day after day, year after year.

If you're doing any kind of work requiring large engine lathes, or electronically controlled contouring lathes you should get in touch with Mack-Hemp at 950 Bingham, Pittsburgh 3, Pennsylvania.

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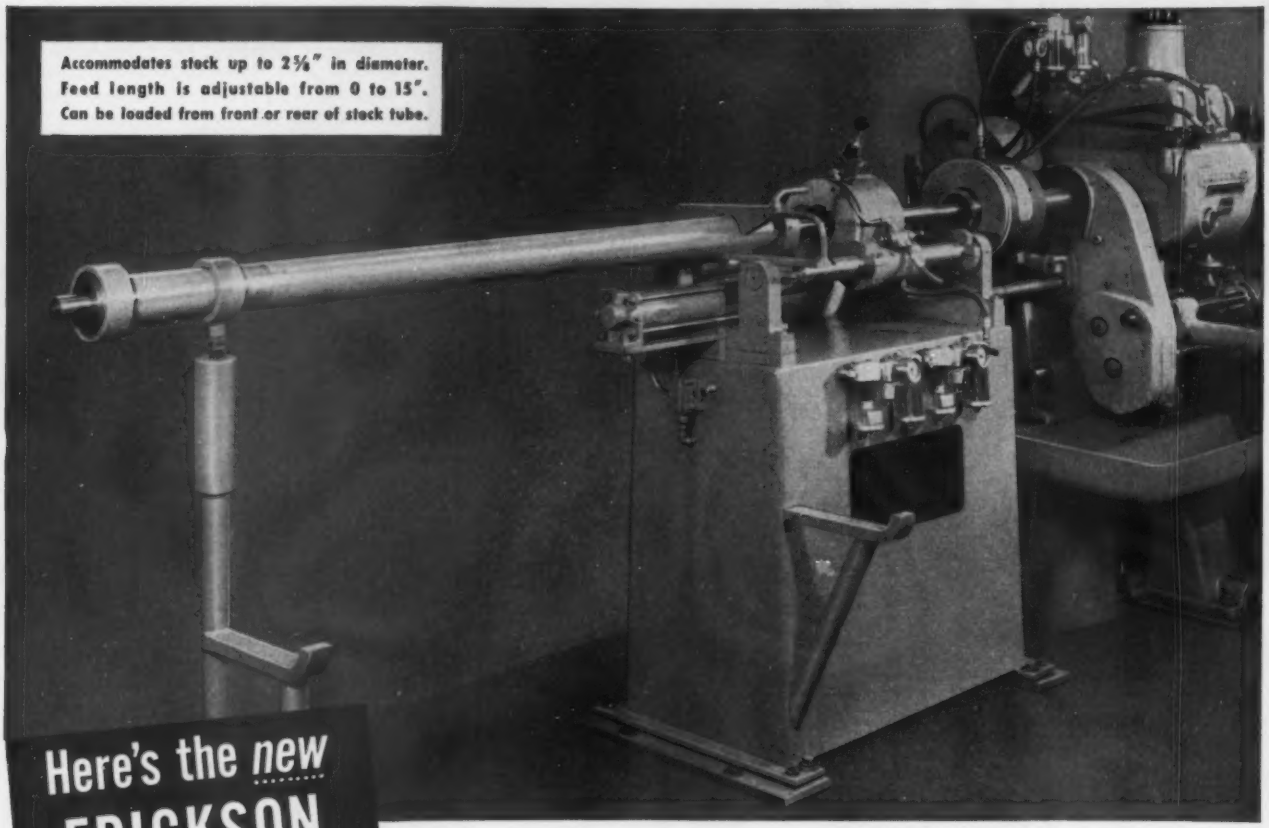
COMPANY

Makers of the rolls with the striped red wabblers

PITTSBURGH AND MIDLAND, PA.

MACKINTOSH-HEMPHILL PRODUCTS INCLUDE: all types of cast mill rolls . . . improved Johnston patented corrugated cinder pots and slag handling equipment . . . Mackintosh-Hemphill rotary straighteners . . . electronically controlled contouring lathes . . . screw feed roll turning lathes . . . heavy-duty engine lathes . . . shears . . . end-thrust bearings . . . steel and special alloy castings . . . reversing hot strip mills . . . Y-type cold strip mills.


Accommodates stock up to 2⅝" in diameter.
Feed length is adjustable from 0 to 15".
Can be loaded from front or rear of stock tube.

Here's the *new* ERICKSON PNEUMATIC BAR FEED!

...An Automatic Air Stock Feed and Collet Operating Unit Designed to Operate with any Collet Equipment

• *Increases production* • *Reduces operator fatigue*

THIS NEW ERICKSON Stock Feed automatically feeds bar, hex or tubing stock to your machine tools for rotating or non-rotating machining operations. It is an air-powered, fully automatic unit which is quiet, simple to operate, safe to use, rugged and dependable. It can be used with any type of collet equipment.

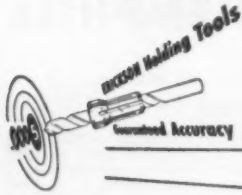
EASE OF OPERATION reduces operator fatigue and speeds set-up cycle time. One valve controls entire operation. At a flick of the valve handle, spindle collet opens and feed chuck advances stock to preset length; feed chuck then opens its jaws. Another flick closes spindle collet on stock and returns feed chuck to its starting position where it closes its jaws on stock to give double grip.

AA-978

OPERATIONAL ADVANTAGES

- Assures positive movement of stock. No dragback of stock on return stroke.
- Adjustable feed chuck jaw pressure eliminates marring or crushing of stock while providing positive grip.
- Permits use of exact size, polished stock.
- Provides double grip on stock to resist "pushback".
- Stock feed is adjustable to suit cycle time and bar size.
- Stock moves with spindle rotating to reduce cycle time.
- No safety controls needed due to basic design.
- Filler tube is supported over its length by ball bearings in stock tube. It rotates with stock to prevent marring, eliminate chatter.
- Rugged welded base construction rigidly supports feed chuck, dampens vibration, reduces whip, guaranteeing smoother finishes, quiet operation.

For complete information on the new Erickson Pneumatic Bar Feed, send for your copy of Circular K-2 today!



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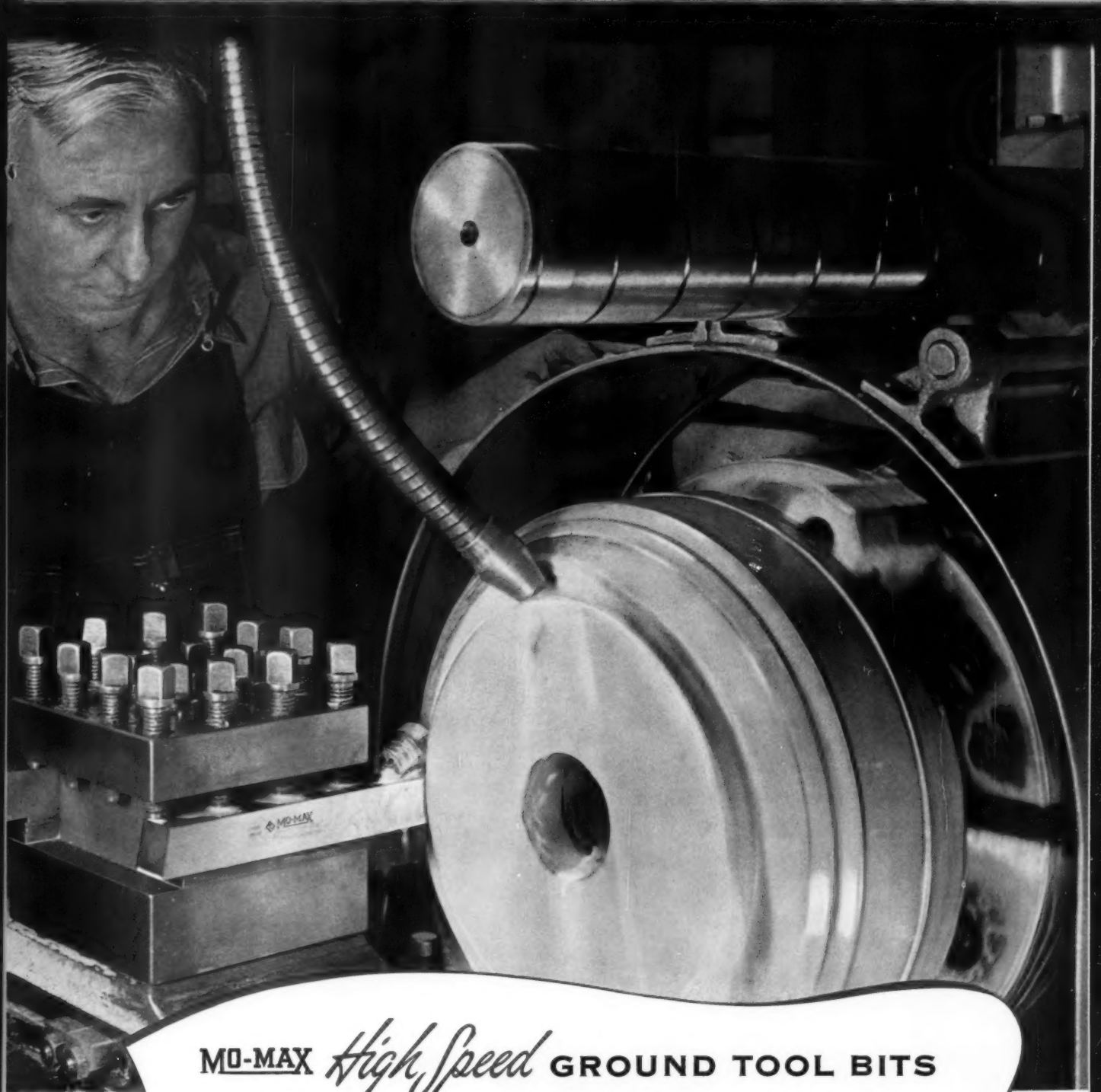

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Tough and Rugged, with Superior Cutting Qualities

MO-MAX and MO-MAX COBALT Tool Bits have been used economically for many years in thousands of plants...under all conditions. Without exception they have proved conclusively that they perform better than other high speed steels. Try the MO-MAX brand on your next job.

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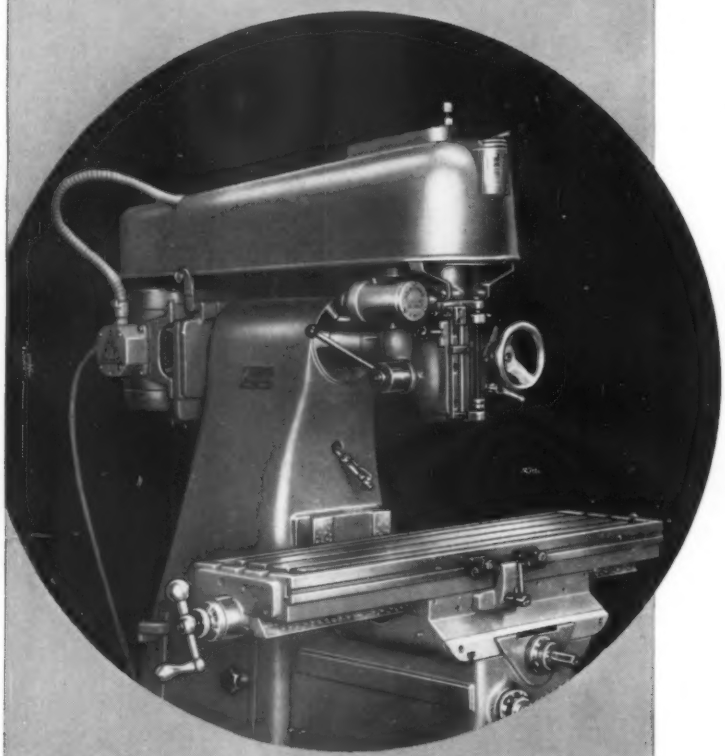

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Here's the new U. S. Vertical Miller with Power Feed Head – the head into which U. S. has built all the most wanted features without sacrificing traditional U. S. simplicity. Check its infinitely variable feed rate, its 800 pounds of down thrust on the quill, its supplemental hand feeds – it is the milling head that was designed to meet all shop needs.

Add to these the basic advantages of the U. S. Vertical Miller. You can easily see why it's the milling machine that "does more work more easily."

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more versatile
Feed infinitely variable from .002" to .008" while in operation

greater capacity
5½" power quill travel; 800 lb. down thrust

more convenient
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Enclosed hard chrome plated quill with internal lock

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Du Pont's Vapor Degreasing Solvent for Metal Cleaning

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These excerpts are from typical performance reports received from metalworking plants throughout the country.

"Fine, consistent performance. Both aluminum and brass parts are brighter. We've increased operating period between cleanouts by about 25 per cent."
—Parts Mfr., Mass.

"We're getting cleaner parts . . . extended operating time between cleanouts . . . reduced maintenance costs . . . effective recovery of stabilizers during normal distillation."
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"Degreased parts are brighter and cleaner. Chemical control of solvent greatly simplified and . . . we have peace of mind."
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Just what you need for your TOOL ROOM!

These handy sets fill an important need in every tool room. The convenient block protects tools against damage or mislaying and keeps them together with each size in place, always available for instant use.

WELDON CORNER ROUNDING END MILL SET

This set consists of block with 8 end mills in following radius sizes: 1/16", 3/32", 1/8", 5/32", 3/16", 1/4", 5/16", 3/8".

WELDON TOOL ROOM END MILL SET

This set consists of block with 14 small end mills, in sizes from 1/8" to 1/2". Also one Weldon Holder No. H1-2 with No. 7 B & S Shank.

WELDON "TU-LIP" COUNTERBORE SET

Here you have your choice of 3 sets, made up of stock sizes from 1/4" to 3/4". *Set No. 1, Straight Shanks—Short Type; Set No. 2, Straight Shanks —Long Type; Set No. 3, Morse Taper Shanks.*

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THE WELDON TOOL COMPANY

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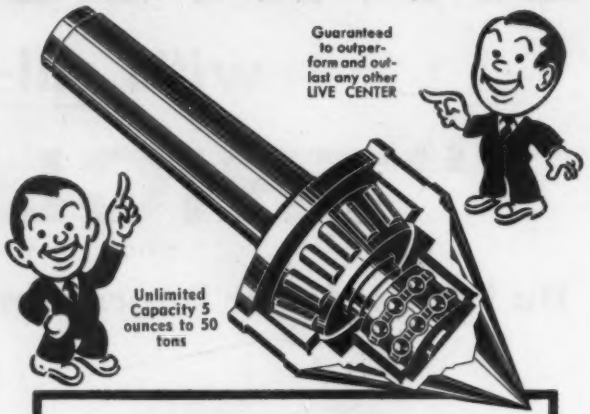

IN OVER 13 YEARS...

We have never seen a MARVECO LIVE CENTER so badly damaged or worn that it could not be rebuilt to new tool specifications.

Based on long-life, precision performance, MARVECOES are the most economical live centers you can buy.

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MAYES spline gages are carefully controlled as to design, material, heat treatment, tolerance and finish to assure our customers of the best obtainable gage for the part inspected.

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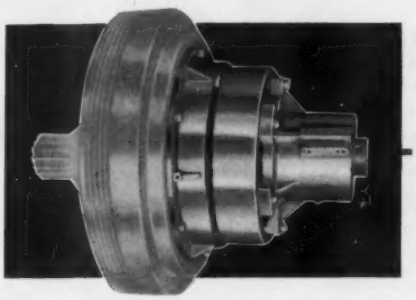
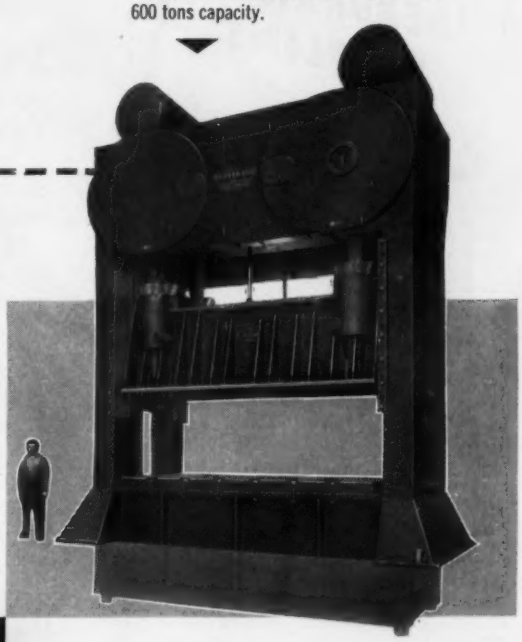
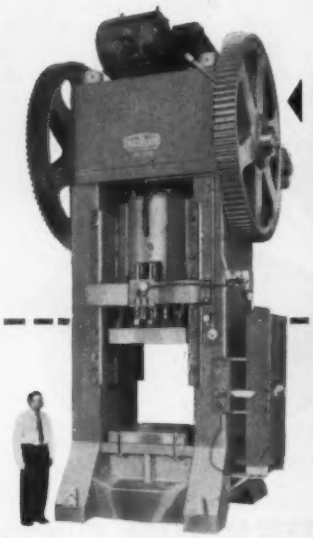
Powered by the Clutch that's



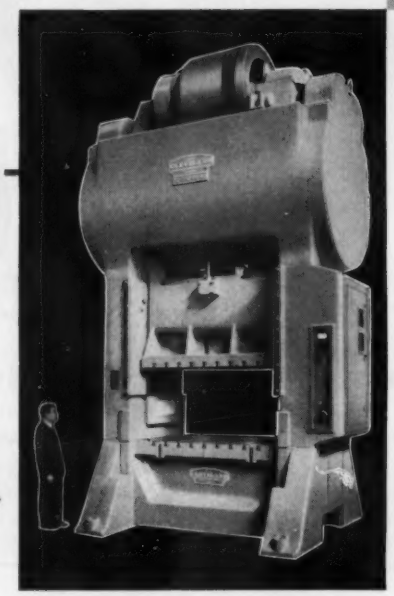
"Revolutionizing" Production

Cleveland S 4-600-204-102 Four Point Press, 40" stroke, 102 x 204" bed area, 600 tons capacity.





Cleveland S 1-800 Single Crank Press double geared, 16" stroke, 48 x 42" bed area, 800 tons capacity.



Cleveland S 2-350-60-42 Double Crank Press, 8" stroke, 42 x 60" bed area, 350 tons capacity.

It doesn't matter which of the 11 types of Cleveland presses best meets your requirements. For as long as it is equipped with our patented Cleveland Clutch, you can be confident that you are getting a press that will give you the best performance obtainable. This proven clutch unit assures minimum down-time, positive, fast control and lower operating costs.

Designed with a minimum number of parts, the patented Cleveland Drum Type Friction Clutch requires only minor adjustments. There is less chance of failure. Its light-weight construction reduces horsepower required for operation. Operational studies prove it to be completely dependable.

Why not investigate the production economy built into every Cleveland Press Equipped with our patented Cleveland Drum Type Clutch. Won't you let us give you the complete Cleveland story? Write or call today!

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which of these
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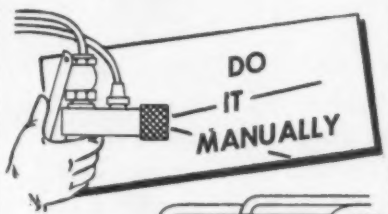
CHECK*

- ☐ Machining slivers
- ☐ Feather edges
- ☐ True burrs
- ☐ Low drilling crowns
- ☐ Associated chips
- ☐ Light extruded metal
- ☐ Tool fuzz
- ☐ Gear teeth
- ☐ Deep holes
- ☐ Spirals
- ☐ Recesses
- ☐ Slots
- ☐ Threads



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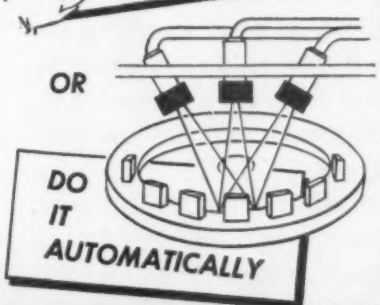

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you may not feel it, but

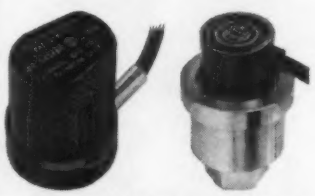
VIBRATION

can wreck your tools

Your hand may never sense it... but your balance sheet feels the effect of tool vibration. For vibration destroys tool edges . . . and increases costs . . . until your profits may literally vanish.

First step in curing these tool-killing vibrations is locating and measuring them. CEC's 1-117 Vibration Meters and vibration pickups, will do this for you . . . accurately, quickly, inexpensively. Where usual trial-and-error corrective measures...changing speed, cutting angle, coolant and clearances . . . don't cure tool breakage, try CEC's *electronic* vibration-measuring instruments. By pin-pointing vibration's *cause*, they can help make higher speeds and feeds practical, improve work finish, and *increase cutter life by as much as 75%*.

TYPICAL CASE HISTORY... Abnormally short tool life on 4130 steel. A CEC vibration meter and pickup located a 700-cycle-per-second vibration with an amplitude of only .0003", undetectable to the touch. Cause was tracked down to improper tool seating. Regrinding the post and lapping the seat eliminated the vibration...and more than doubled useful tool life.



Pickups are available for measurement of either linear or torsional vibration.

Send for "MACHINE TOOLS AND VIBRATION," Bulletin CEC 1555-X2.

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From the *American Machinist* Library of *Tips for Top Shop Men*

SOME wag said long ago that it isn't smart to step on other men's hands as you go up the ladder—you may need their help coming down. It's just as true that the man who makes his way up by slipping a knife in the back of the man above, spends his time up there ineffectually because he's always got one eye cocked over his shoulder, watching for the knife.

U. S. Vulcanite work wheel brings new quality to centerless grinding

This non-porous rubber bonded type wheel will

A Produce superior high finishes (8 down to 4 Micro) on final passes.

B Deliver more pieces per wheel—for greater economy. (Specify A80-R2-R8)

C Resist the dressing action of sharp projections that have a small area of contact. (Specify A80-T3-R8)

These U. S. VULCANITE WORK WHEELS have done the above jobs for many manufacturers—and will provide you with better grinding quality and *reduce your costs.*

EXTRA DIVIDEND: Remember that when you buy wheels from a United States Rubber Company salesman you are dealing *direct* and are being served by a specialist—a man whose only job is selling and *servicing* abrasive wheels. He will see that you get maximum value out of your abrasive wheel dollars.

"U. S." Research perfects it...
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Zagar Gearless Drill Heads

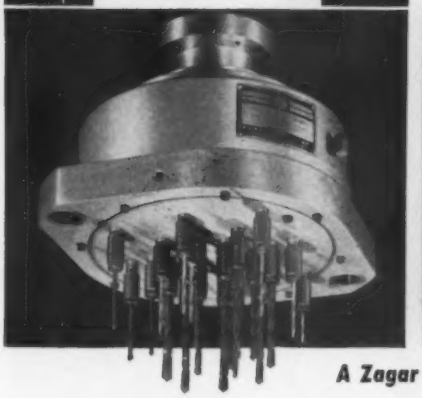
put 4 big advantages to work for you

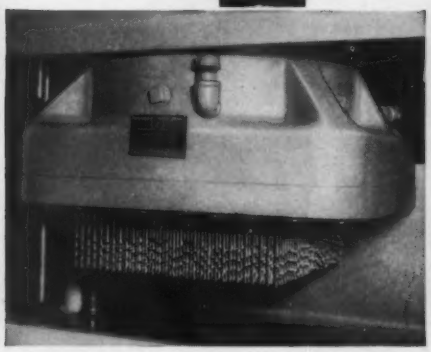
Any number of holes

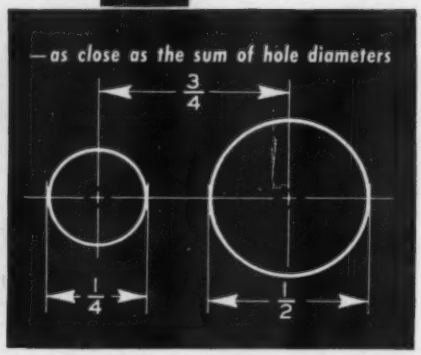
Any hole pattern

Any material

On all centers







A Zagar drill head is never obsolete. Zagar can re-locate spindles for other hole patterns.

Can you visualize the savings made possible by drilling up to 1000 holes at one pass? Zagar standard practice can handle any machinable material up to 1½" diameter. Holes of varying diameters can be drilled to form any pattern. Zagar Gearless Drill Heads, their efficiency proven by many years' success, can be installed on existing drill presses. Or, Zagar will lay out the necessary tooling for your entire job. May we see your sample parts and study your requirements? There is only one *right* answer—one *best* answer—for those requirements. May we supply it?

Let ZAGAR tooling plan the complete job for you

Whether your runs are long or short, let Zagar engineering survey your needs with a view to saving you the cost of special machines. In the case at the right two lines of *standardized* self-clamping drill jigs ream, tap and drill an aluminum die casting, both valve body and cover. The problem of limited production was readily solved. What, sir, are your requirements?

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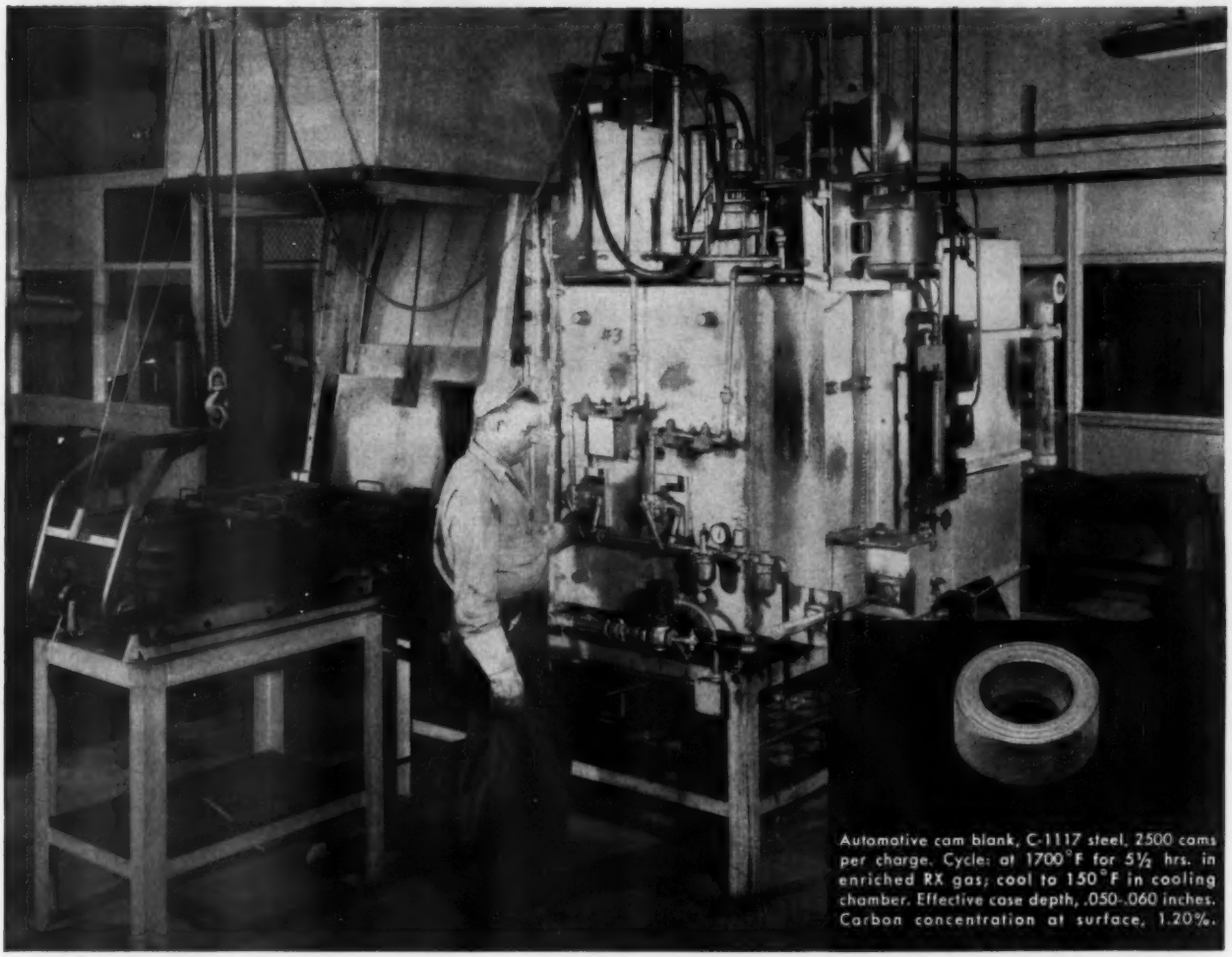
Get more information via Zagar's Engineering Manual A-3.



Automotive cam blank, C-1117 steel, 2500 cams per charge. Cycle: at 1700°F for 5½ hrs. in enriched RX gas; cool to 150°F in cooling chamber. Effective case depth, .050-.060 inches. Carbon concentration at surface, 1.20%.

ALLCASE FURNACES PAY OFF FOR AUTO-LITE

Ability to handle increased production schedules has benefited The Electric Auto-Lite Company, Toledo, Ohio, since they installed 'Surface' ALLCASE furnaces for gas carburizing automotive parts.

Results achieved on cam blanks typify the advantages of these furnaces. By utilizing ALLCASE furnaces and an RX® gas generator, closer control of the surface carbon has been achieved and, as a result, physical characteristics of the parts are considerably improved. Rejects have been cut drastically. By changing from pack to gas carburizing, savings have also been realized from reduced handling and the elimination of pack material, pots, fireclay, and necessary cleanup.

Wherever you want high volume batch production for any controlled atmosphere process, specify the cost-cutting ALLCASE furnace. It's equipped with radiant tubes; cooling chamber or enclosed quench, or both; and can be fully automatic from charge to discharge.

- Call your 'Surface' engineer or write for Bulletin H54-10.

Surface
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SURFACE COMBUSTION CORPORATION • TOLEDO 1, OHIO

How miller welders helped seal the arteries of America's largest single purpose power plant...

Substantial monument to Free Enterprise is OVEC and IKEC, suppliers of electric power to the Atomic Energy Commission's new uranium diffusion center in Pike County, Ohio.

Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, agreed to supply electric power to this great new atomic production center . . . *15 billion kilowatt-hours annually.*

Two huge generating stations are being built: The Kyger Creek Plant at Cheshire, Ohio will have five generating units of 200,000 KW each; Madison, Indiana's Clifty Creek plant will produce 1,200,000 KW with its six big generators. Each of the eleven turbo-generating units will operate off a single boiler, with super-heated steam reaching 1,050 degrees Fahrenheit under 2,000 lbs. pressure per square inch! The high temperatures and reheat, which the sponsor companies have pioneered in their own right, will make these two plants among the most economical, most efficient generating stations in the country.

These same elements, however, make the fabrication of faultless high-pressure steam lines vital . . . and extremely difficult. To accomplish this extremely important task, pipe welding specialists equipped with the maximum of engineering skill utilized the Miller Selenium Rectifier d-c Arc Welder.

". . . . if it's Miller, you *know* it's the *finest!*"

Miller Selenium Rectifier d-c Arc Welder, in four wide-range models. For complete, concise, worthwhile information on these and other Miller Arc and Spot Welders, contact us today . . . at no obligation, of course.

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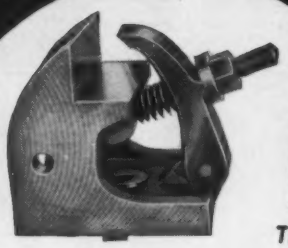
APPLETON, WISCONSIN

CUT SET-UP COSTS HUNDREDS OF WAYS WITH HART MILLING FIXTURES



"Masters of A Thousand Set-ups"

Eliminate the need for many special expensive jigs and fixtures.

You will save time and money on most set-ups with Hart Milling Fixtures. They hold round, hexagonal, octagonal or square stock, for miller, shaper, drill press and tapper; they reduce set-up time and speed production. Hart Milling Fixtures are made in four useful sizes, and designed to be used in horizontal or vertical position. Let us send you full description and prices.

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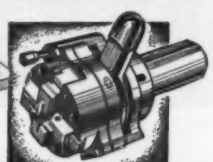

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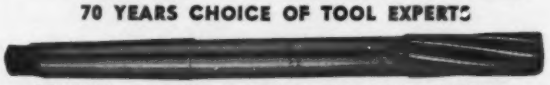

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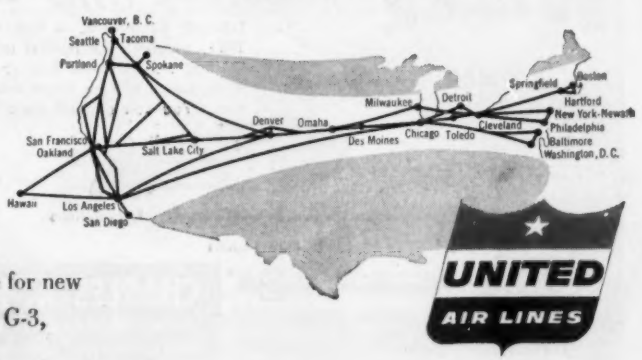

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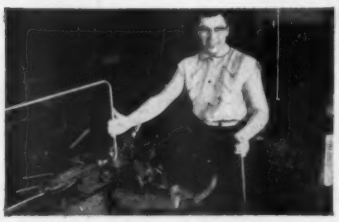

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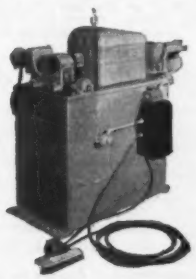

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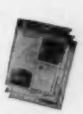

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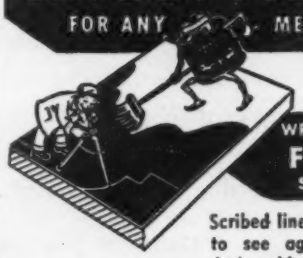

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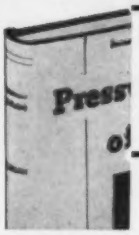

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MARVEL: #6A Hacksaw, 6"x6", Auto. Feed

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LANDIS: 2½" Single head horiz. Threading
LEES BRADNER: #40A Thread Miller
LEES BRADNER: CT-36 Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. cap.
PRATT & WHITNEY: 4½x12" Thread Miller

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MOLDING MACHINES ROLLER JOLT: Osborne 2047-3
AUTOMATIC SCREW MACHINE: Wickman, Single Spindle, 7/16", new
TEST STAND: Denison 918-AM Hydraulic
HARDNESS TESTER: Gagan Brinell 16-8
SHEFFIELD PRECISIONNAIRE GAUGE
SUNDSTRAND: Double End #53 42" & 60" Centering Machines
HEALD: #22 Rotary Surface Grinder

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AUTOMATIC SCREW MACHINES
ACME GRIDLEY R6, 1⅝", 6-spindle; late type
ACME GRIDLEY R8, 1¾", 8-spindle; late type
CONOMATIC 1⅞", 8-spindle; M.D., late type
NEW BRITAIN GRIDLEY Model 665; 6-spindle chucker; latest type; new 1943.

BORING MILLS—Horizontal
NILES 8" bar; floor type; motor drive
HEALD 46B, 48A single end Borematic; M.D.
HEALD No. 45, 49 double end Borematic; M.D.
LUCAS #42 Precision Boring Milling & Drilling Machine; late type
UNIVERSAL "TRI-WAY" 3" bar, M.D., late

BORING MILLS—Vertical
BULLARD 8", 8-spindle & 16" 6-spindle Type "D" Mult-au-matic; late type
BULLARD 36" spiral drive; PRT; late type
NILES 53", 2 swivel heads, PRT; M.D.
NILES 100" 2 swivel heads, PRT; M.D.
SELLERS 144", 2 swivel heads on cross rail; PRT

BROACHES
CINCINNATI I-30 Duplex Vertical cap. 1 ton 30" stroke; Hydraulic; late
COLONIAL VGI-10-48 Vertical; Hydraulic; late type
LAPOINTE 10-54" Vertical, Model SRV; new 1947
OILGEAR 3XA horizontal; cap. 20,000 lb; 56" stroke; hydraulic; late type
OILGEAR type XL-6 single ram; late type.

DRILLS—Radial
AMERICAN 4' arm 11" col. "Hole Wizard", late type
AMERICAN 5' arm 11" col. "Hole Wizard", late type
AMERICAN 5' arm 13" col. "Hole Wizard", late type

DRILLS—Manufacturing
AVEY #2—2-spindle high speed, motor drive, late
BARNES #262 Heavy Duty Camel Back; late type
BARNES H-2 Hydram; 2" cap.; 22" swing; hydraulic
LELAND-GIFFORD 1LMS, 4-spindle, M.D.; late
LELAND-GIFFORD 2LMS, 2-spindle, M.D.; late
LELAND-GIFFORD 2LMS, 4-spindle, M.D.; late
NATCO B-4-B "Hole Steel" 60 adj. spindles; late
NATCO B-3-B "Hole Steel" 12 adj. spindles; late
NATCO E-5 high speed. 10 adj. spindles; late

FELLOWS GEAR EQUIPMENT
FELLOWS No. 6 High Speed Gear Shaper; late
FELLOWS No. 48 High Speed Gear Shaper; Internal cap. 72" diameter; late type
FELLOWS No. 6IA & 6I5A High Speed Gear Shaper
FELLOWS No. 6Z2 High Speed Gear Shaper; late
FELLOWS No. 7A, No. 72 and No. 75 High Speed Gear shaper; late type
FELLOWS No. 13 LS Lapper; motor drive, late
FELLOWS 20-M Red Liner; New 1953
FELLOWS 24-M Involute Measuring Machine; New 1952

GLEASON GEAR EQUIPMENT
GLEASON 3" Spiral Gear Generator; late type
GLEASON No. 7 Hyp. Cutter Sharp; latest type
GLEASON No. 13 Hyp. Cutter Sharpener; late
GLEASON 12" Spiral Bev. Cutter Sharpener; M.D.
GLEASON 12" Straight Bevel Generator; late type
GLEASON No. 14 Spiral Bevel Hyp. Gear Grinder
GLEASON #16 Hypoid Gear Generator, motor drive.
GLEASON No. 17 Spiral Bevel, Zerol and Hypoid Gear Grinder, M.D., late type
GLEASON No. 18 Gear Tester and Lapper; M.D.
GLEASON No. 20 Spur Gear Tester; latest type
GLEASON #22 Hypoid Formate Gear Finisher; late
GLEASON 25" Straight Bevel Gear Gen.; M.D.
GLEASON 24" and 37" Bevel Gear Planer; M.D.
GLEASON 25" Spiral Bevel Gear Gen.; M.D.
GLEASON No. 6 Revacycle 5" cone distance; late

GRINDERS, Cyl. Plain & Univ.
BROWN & SHARPE #3 Univ. motor drive, late type
CINCINNATI 14"x72" Universal; M.D., late type
CINCINNATI 6"x18" Mod ER Plain, "Flimatic"; late
CINCINNATI #2 Centerless, Model EA Flimatic; late
LANDIS 20"x144" Plain Cyl. gap type, M.D., late
LANDIS 4"x12" Type H Hydraulic; late type
LANDIS 10"x18" type C Plain, Hydraulic, late
LANDIS 10"x36" type DC plain hydr. with infeed; late
LANDIS 20"x144" Plain Gap Grinder; late type

Complete Catalog on request

NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x18" Type "C" Plain; late type
NORTON 10"x48" Type C Hydr. Plain Cyl; late type
NORTON 16"x72" type "C" Plain; late type

LATHES, Turret
GISHOLT #1L and #2L Saddle type; Timken; late
GISHOLT #3 Universal ram type; M.D., late type
LIBBY #4H, 12" hole, motor drive, late type
MOREY #2, #3, #4, #5, ram type; Timken; latest
WARNER & SWASEY #1-A Universal; Hex., late
WARNER & SWASEY #2 Geared Head; late type

LATHES, Engine & Mfg.
AMERICAN 16"x102" centers. "Pacemaker"; late type
GISHOLT #12 Hydraulic Automatic; motor drive; late
HENDEY 24"x36" centers; motor drive; late type
HENDEY 16"x72" centers Yoke Head, M.D., late type
LeBLOND 20"x48" centers, Timken; M.D., late type
LeBLOND 42"x108" centers, Timken; M.D., late type
LODGE & SHIPLEY 12"x30" centers. Toolroom
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH Model EE 10"x20" centers. Toolroom; late
MONARCH 12"x30" centers; Model CKK; late type
MONARCH 16"x54" Centers, Motor Drive
MONARCH 16"x78" centers, Model CW, Timken, late
NILES 30"x50" bed, single and boring, "Time Saver"
NILES 30"x108" c.c. Geared Head; Timken; late
NILES 36"x100" centers "Time Saver"; motor drive
PRATT & WHITNEY 16"x30" centers; Timken, late
SPRINGFIELD 20"x48" c.c., motor drive; late type
SUNDSTRAND 10"x60" centers; auto Type B; late

MILLING MACHINES, Plain
BROWN & SHARPE #2 M.D. late type
BROWN & SHARPE #10, motor drive; late type
CINCINNATI I-18 Production; Timken; late type

MILLING MACHINES, Thread
HALL Style "D" Planetary; late type
LEES BRADNER Model #LT 6"x36" and 6"x72"; #HT 12"x24" and #HT 12"x36" centers; late type
MOREY 12"x30" and 12"x160" centers; late type

MILLING MACHINES, Universal
CINCINNATI #3 Dial Type, Timken, M.D., late
VAN NORMAN #22L, #26 and #36 ram type; late

MILLING MACHINES, Vertical
CINCINNATI #4 High Speed Dial type; late
CINCINNATI 0-8 Vertical; Timken; late type
CINCINNATI #3 Dial Type; High Speed, New 1953
KEARNEY & TRECKER #2H, #4H late

PLANERS
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC; Reversing, Late type
LIBERTY 144"x76"x48" adj. openside; box table; 4 hds; vari-voltage; PRT; New 1940
NILES-BEMENT-POND 72"x72"x30"; 4 hds; PRT; DC; M.D.

PRESSES
BLISS #410A, 525-ton double action toggle drawing press; M.D.
NATIONAL #5 "Maxi-Press", 1000-ton cap. H.S. Forging Machine; M.D.
SHAW 250-ton Hydraulic flanging press; late type
WATERBURY FARREL #9, 125-ton cap., M.D.

SHAPERS
CINCINNATI 28"; motor drive; late type
GOULD & EBERHARDT 32"; High Speed; M.D.
HENDEY 12" High Speed Univ. Crank Shaper; late
MOREY 8" Vertical; motor drive; late type
ROCKFORD 24", hydraulic motor drive; late type.

MISCELLANEOUS
ALEXANDER #2, 3-dim. Engraving NEW 1952
BARNES No. 172 Honing; M.D., hydr.; late type
HILLES & JONES #7 Plate Bending Roll; capacity ⅞" x 16'; motor drive
LeBLOND No. 2 Deep Hole Reaming, late type
LeBLOND No. 2 Deep Hole Rifling, late type
MANVILLE No. 3 Bolt Head Trimmer, M.D.
MANVILLE 2C Screw Slotter, Motor Drive
MANVILLE No. 1 Screw Slotter, Motor Drive
HUGH SMITH cap. 1" thick plate x 25' between housings-Plate Bend. Roll, M.D.

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Model V10 Hammond Belt Sander, m.d.
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7½ H.P. U. S. Elec. Tool Co. Disc Grinder, m.d., new
14A Gardner Grinder, m.d.
No. 24—33" Gardner Horizontal, m.d.
No. 186—36" cap. Gardner, m.d., latest type
No. 124—53" Gardner Horizontal, m.d.

PLAIN CYLINDRICAL GRINDERS

6x15" Cincinnati Plain Hydraulic, m.d.
6x18" Cincinnati Model EA, m.d.
6x18" Cincinnati Model ER Plain Hydraulic, m.d., Filmatic Spindle
6x18" Landis Type C Hydraulic, m.d., late
6x30" Cincinnati Hydraulic, m.d.
10x18" Cincinnati Model EA, m.d.
10x18" Norton Type C, m.d., latest
10x36" Cincinnati Hydraulic, m.d.
10x36" Norton Type C, m.d.
10x72" Landis, m.d.
10x72" Norton, motorized
12x96" Landis Plain Self-Contained, m.d.
14x36" Landis Plain Hydraulic, m.d.
14x52" Norton, motorized
16x72" Landis Plain, m.d.
16x72" centers Type C Norton Semi-Auto Hydraulic
18x72" Norton Type C, m.d.
No. 20—10x18" Brown & Sharpe, m.d.
20x120" Landis Plain Self-Contained, m.d.

UNIVERSAL CLINDRICAL GRINDERS

10x24" Landis Type C, m.d.
14x72" Cincinnati Model ER, m.d., latest type, Filmatic Spindle
12x48" Norton Universal, m.d., latest
18x56" Landis Universal Type C, m.d.

HONING MACHINES

No. 854 Micromatic Vertical Honing Machine, m.d.
H1 Micromatic Horizontal Hydrohoner, m.d.
H4 Micromatic Horizontal Hydrohoner, m.d.
No. 6 Barnes Twin Spindle
Model #182 Barnes Drill Hone, m.d., latest
No. 306H Barnes, single spindle
No. 224B Barnes Honing Machine, m.d.

KEYSEATERS

3A Mitts & Merril, m.d.
No. 3 Niles Cotter & Keyseat Milling Machine
No. 4 Mitts & Merrill, m.d.

THREAD GRINDERS

No. 33 Excello, m.d.

INTERNAL GRINDERS

Model 5Y Bryant, m.d.
No. 16—16" Bryant, m.d., Hydraulic Hole Grinder
No. 16CR16 Bryant, m.d., latest
No. 16—22" Bryant, m.d., latest
No. 16—38" Bryant, m.d., latest
No. 16-A-28 Bryant, m.d.
No. 2436 Bryant Hole & Face Type, m.d., late
No. 24P—26" Bryant, m.d.
No. 24—21" Bryant, m.d.
No. 24-L-36 Bryant, m.d., late
No. 24-LW-36 Bryant, m.d., late
No. 44 Heald Facing Type Borematic, m.d.
No. 70A HEALD, m.d., latest
No. 72 Heald Sizematic, m.d.
No. 72A Heald Sizematic, "Duplex", m.d.
No. 72A Heald Gagematic, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A5 Heald Sizematic, m.d.
No. 72A5 Heald Plain, m.d.
No. 73 Heald Airplane, m.d., latest, new
No. 74 Heald, m.d.
No. 75A Heald, m.d., latest
No. 78 Heald Centerless Cylinder Grinder, m.d.
No. 81 Heald Gagematic, Sizematic, m.d.
No. 81 Heald Plain & Sizematic, m.d.
No. 649—16" Van Norman Automatic Oscillating Radius, m.d., latest
No. 5 Bryant, m.d., latest

PUNCHES & SHEARS

No. 2 Hilles & Jones Horizontal Punch, m.d.
No. 6 Long & Allstatter Single End, m.d.
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Cleveland Shear, 72" gap, 18" blade, 1" plate
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Wiedemann R7 Turret Punch

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2" Forbes Type Curtis & Curtis Pipe Machine, m.d.
No. 326 Oster Bolt & Pipe Thread Machine, m.d. latest
6" Landis Pipe Threader

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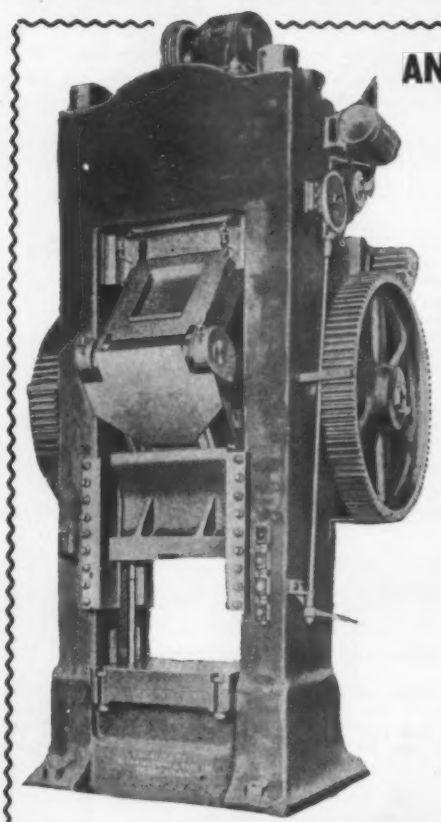

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27"x18' MONARCH "N" Geared Head Lathe, 11' centers, Taper Attach., Full Equipment, Late Type, 1942.

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24", 36", 42" BULLARD Vertical Turret Lathes, New Era, Turret Hd., Side Hd. M.D.

1A WARNER & SWASEY Turret Lathe, Heavy Duty, Power Chuck Wrench, Timken Bearing.

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MILLING MACHINES

No. 2-18 CINCINNATI Plain Auto. M.D., Late

No. 2 BROWN & SHARPE Vert. Mill, Light Type, Swivel Head, M.D., Late.

No. 1-8 KENTS OWENS Hydraulic Horiz. Mill, Late Type, M.D.

6' arm x 17" column FOSDICK Economax Hydraulic Radial Drill, Motor on arm, late type.

6' arm x 19" col. CARLTON Radial Drill, 20 HP., late type.

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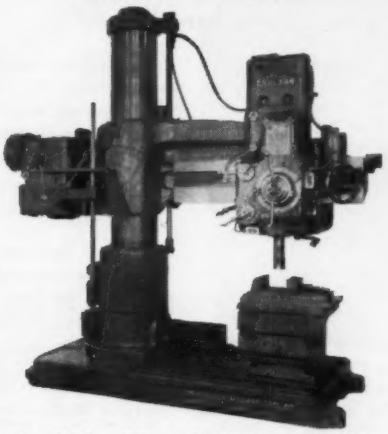

4' ARM, 15" COLUMN CARLTON RADIAL DRILL. 48 SPINDLE SPEEDS 15-1500 RPM. MOTOR ON ARM. 1943.

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400 tons CHAMBERSBURG Hydraulic Wheel Press, 14" Ram, 96" between Tie Bars, 12' to End Support. M.D.

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16"x72" Cincinnati Cylindrical 1942
20 MB Smalley-General Thread Mill '42
Tangent Bender Single Wing Struthers-Wells 1947
36"x8' Betts Geared Head 1942
2-G Brown & Sharpe Automatic 1941
11-1 Cleveland O.B.I. 110 Ton 1941
2-18 Cincinnati R&F Prod. Mill 1942
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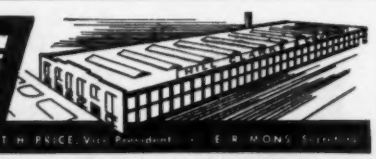

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No. 2LMS L-G—2 spdl.—20" sw.
No. 2MS Allen—3 spdl.—24" sw.
No. LBM L-G—3 spdl.—20" sw.
No. 3 Avey—2 spdl.—24" sw.
No. K60H Fox Multiple

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11" Gleason Gear Generator
No. 36BM Gould & Eberhardt
No. 615A Fellows Gear Shaper
No. 612A Fellows Gear Shaper
No. 65 Fellows, Cone Drive
No. 12HS Gould & Eberhardt

GRINDERS
No. 2 Cincinnati Centerless
No. 4H—4"x12" Landis Plain Cyl.
5"x30" Norton Cam-O-Matic
5"x42" Norton Type C Pl.
6"x18" Norton Type C Plain
8"x15" Elgin EB-5C
10"x18" Norton Type C Pl. Cyl.
10"x36" Norton Type C
10"x36" Norton Type C Cam Gdr.
14"x48" Landis Type C Plain
14"x72" Landis Univ.
14"x168 Landis Pl.
16"x36" Norton Type C Pl.
16"-26"x72" Norton Pl.
18"x120" Norton Type A Plain
20"x192" Norton Type A Plain
24"x264" Norton Type A Plain
26"x72" Norton Pl.
No. TG615 J. & L. Thread Grinder
No. 81 Heald Int. Centerless
No. 74 Heald Int. Centerless
No. 72-A Heald Univ. Int.
No. 72A5 Heald Int. (1942)
No. 5 Bryant Internal
No. 5A Bryant Hole & Face
No. 5B Bryant Internal
No. 16-16 Bryant Internal
No. 16-28 Bryant Internal
No. 16A16 Bryant
No. 16A-28 Bryant Internal
No. 16F-28 Bryant Internal
No. 16-36 Bryant Internal
No. 24-26 Bryant Internal
No. 24-36 Bryant Internal
No. 24L-36 Bryant Internal
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No. 16—30" Blanchard Rotary Surf.
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No. 6 Warner & Swasey, bar fd.
No. 7A Jones & Lamson
No. 2A Warner & Swasey
3A Warner & Swasey Turret (1942)
No. 3AL Gisholt Cross Slide
No. 3H-10 Libby International
No. 3A Warner & Swasey Turret Lathe
No. 4A Warner & Swasey M.D.
No. 4A Warner & Swasey (1944)

MILLING MACHINES
No. 2HL K. & T. Milwaukee Plain
No. 4 Cincinnati Dial Type Plain
No. 08 Cincinnati Vertical
No. 3K K. & T. Milwaukee Vert.
No. 4H K. & T. Milwaukee Vert.
118 Van Norman Hyd. Mfg. (1942) Model A Briggs Mfg.
54"x30"x16' Ingersoll Slab
10"x60" Pratt & Whitney Thread
12"x102" HT Lees-Bradner Thread
No. 118 Van Norman Hyd. Mfg. Mill

PLANERS
48"x36"x14' Gray
60"x48"x27' American, 4 heads

MISCELLANEOUS
8 Spdl.—6" Goss & DeLeeuw Chucker
No. 56 Sundstrand Double End Cent. Mach.
15" Dill Slotter
18" Dill Slotter
Model 200 Micromatic Hor. Hone
Model H-7 Micromatic Vert. Hone
No. 224 Barnes Vertical Hone
No. 306 Barnes Vertical Hone
No. 6 R. & K. Straight Side Press 42"-ga. Economy Shear, M.D.

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3" bar Yoder table type, new 1942.
No. 2 Pratt & Whitney Jig Borer, Serial 323.
42" Bullard New Era vertical T/L
3¾" Bar No. 32 Lucas, horizontal, table type
36" Rogers vert. T/L side head, new 1942

DRILLS, RADIAL

4' arm 13" col. Carlton M.O.B.
9 ft. arm 16" column American, late type

GRINDERS, CYLINDRICAL

4"x18" Cincinnati pl. hyd., plunge cut, 1946
6"x18" Landis "C", 30 deg. head, 1941
10"x18" Cincinnati fitmatic, type ER (2), 1941-1946
14"x36" Landis type C, hydraulic (2), 1946
16"/26"x72" Norton type C, hydraulic, 1945
16"/40"x120" Landis gap type, hydraulic; serial 16193
12" Model 22 Heald rotary surface, 1942
16A2 Blanchard rotary surface, serial 6046, 1946
14"x36" Pratt & Whitney vertical surface grinder, 1942.
72" No. 72 Hanchett rotary surface, 1946
No. 2 Cincinnati centerless (3), 1942-1943

LATHES, ENGINE

10"x18" Hendey toolroom, serial 29620
12"x30" Monarch model C, ser. CK16407, 1942
24"x48" Monarch toolroom, serial CK-14677, 1942
14"x42" Hendey G.H., M.I.B., 1940
24"x14 ft. bed American G.H., Q.C.G., serial 44070
24"x20' bed LeBlond heavy duty, DC motor, older
54"x30' bed Pond, DC motors, older but excellent

LATHES, MFG. & MISC. & TURRET

No. 5 Gisholt, pre-selector head, 1942
15"x30" Lipe Carbo-Matic, 1942
17"x72" LeBlond Rapid production (5), 1946-1947
No. 5 Jones & Lamson Universal ram type turret lathes, (2) late models

MILLING MACHINES

No. 2 Cincinnati HI-Power plain horizontal
No. 4 Cincinnati HI-power plain horizontal
No. 5 Cincinnati HI-power plain horiz., vert. attach.
No. 4-3S and 4-4S Cincinnati Hydromatic production
No. 3B and 4K Kearney & Trecker plain, late type
No. 3B Brown & Sharpe plain horizontal, new 1942

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1000 Ton No. 666 Toledo Forging
185 Ton No. 7½ Verson O.B.I. (2)
150 ton No. 13-1 Cleveland O.B.I. late type
300 ton No. 1039 Hamilton S.A., D.C.
400 ton No. 603 Toledo knuckle joint
126 Ton No. 93½D Toledo D.C., S.S.
106 Ton No. 93C Toledo SS, DC air cushion
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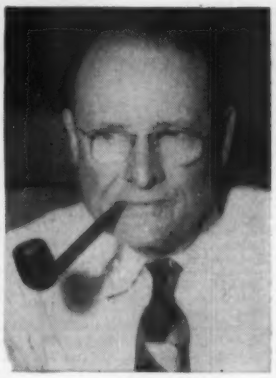

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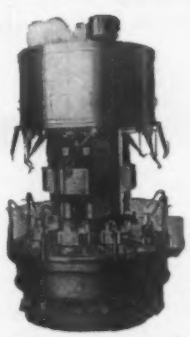

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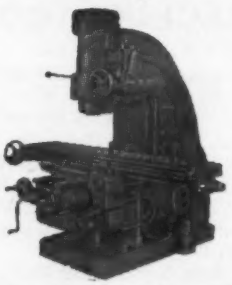

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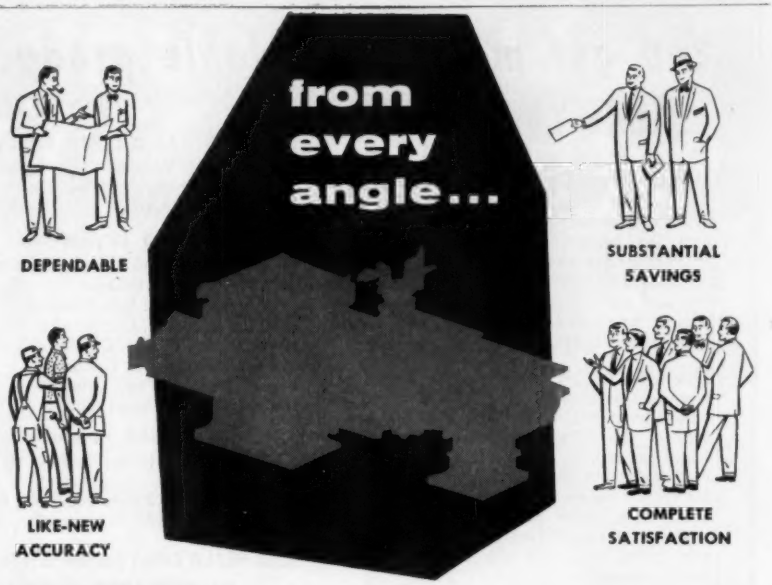

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Index of PRODUCTS ADVERTISED

In This Issue

Abrasives, Coated 48-49

Accessories & Attachments (Machine Tool) 64, 152, 179, 248, 256, 258, 262

Arbors & Mandrels 258

Bearings 62

Bending Machines 261

Blast Cleaning Equipment & Supplies 252

Books, Technical 262

Boring, Drilling & Milling Machines (Horizontal) .....14-15, Insert Bet. 32-33, 33, 34-35, 215, 275

Boring Machines Internal.....2nd Cover, Insert Bet. 32-33, 33, 34-35

Boring & Turning Machines (Vertical) 39, 43, 275

Broaching Machines 46

Centers, Live 250

Centrifugal Machines 260

Chucks 179, 248

Collets 88, 207, 248

Controls, Electrical 173

Counters 32

Coolant Systems, Filters & Supplies 218, 245

Cut-Off Machines 40-41, 180

Cutters, Abrasive 20-21

Die Sets 63, 96

Drafting Room Equipment & Supplies 262

Drilling Machines .....3rd Cover, 24-25, 30-31, 58-59, 72-73, 84, 86-87, 175, 187, 216, 272

Drill Jig Bushings 98

Duplicators & Pantographs 231

Electro Plating & Painting Equipment & Supplies 212, 226-227

Fabricating Methods & Services 232
Exhibits 258, 263

Fasteners .....Insert Bet. 168-168E, 194, 203, 242, 277

(Continued on page 272)

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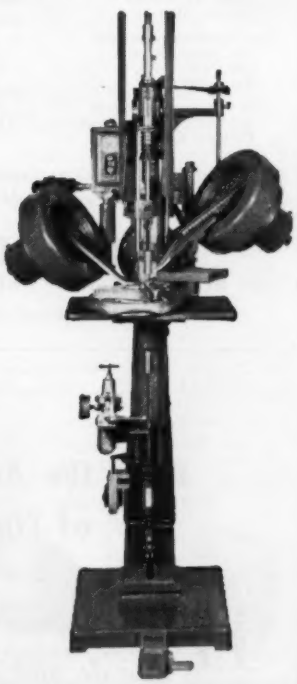

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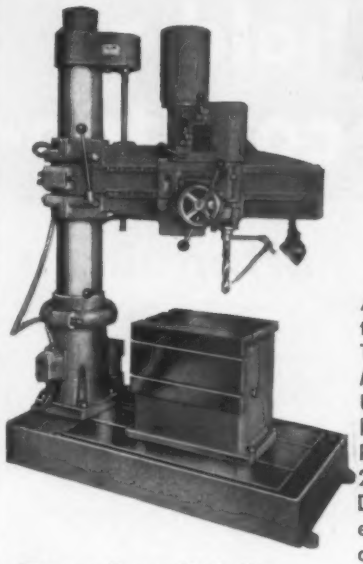

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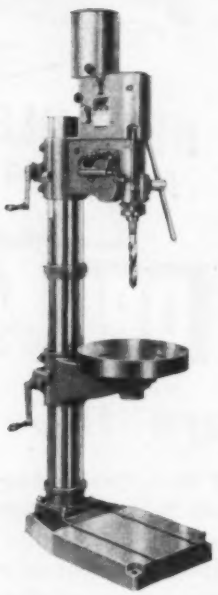

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Index of

PRODUCTS ADVERTISED

In This Issue

•

(Continued from page 271)

Files, Hand.....188, Insert Bet. 200-201

Floor Drying Compounds 206

Forging 211

Gages & Instruments.....16, 56, 94-95, 100, 169, 186, 199, 233, 250, 256, 260, 273, 276, 277

Gear Cutting Machines.....3, 6-7, 55, 78

Gears, Speed Reducer, Motor Reducers.....208, 224

Gear Testers 3, 6-7

Grinders—Cutter & Tool.....93, 240, 278, 280

Grinding Machines—Production....12-13, 18-19, 80, 91, 219, 228-229, 240, 280

Grinding Wheels.....20-21, 192-193, 228-229, 253

Heads: Drilling, Grinding & Tapping 26-27, 254, 256

Heat Treating Equipment & Supplies.....68-69, Insert Bet. 232-233, 255, 258

Honing Machines 81

Jig Borers.....246, 275

Lapping Machines..... 213

Lathes, Automatic.....22-23

Lathes, Crankshaft.....74-75

Lathes, Engine.....37, 76, 247, 259, 279

Lathes, Turret..... 70

Lubricants, Cutting Fluids, Quenching Oils & Solvents.....71, 89, 106, 177, 182-183, 185, 222, 239, 249

Machines, Tumbling..... 274

Marking Machines, Tools & Supplies.....92, 260

Materials, Cutting & Forming 4th Cover, 50, 54, 94-95, 214

Materials of Manufacture.....4th Cover, 44-45, 50, 60-61, 79, 110, 150, 189, 205, 208, 211, 234-235, 241

Materials Handling Equipment....57, 102

Millers, Die Sinkers, Profilers....4-5, 8-9, 26-27, 197, 217, 225, 248B, 262

Index of PRODUCTS ADVERTISED In This Issue

Motors, Electrical 77, 184

Oil Purifiers 209, 218

Planers 28-29

Polishing & Buffing Machines & Supplies 187

Power Transmission 65, 171, 224

Presses, Forging & Forming Equipment & Supplies 40-41, 66-67, 146, 187, 194, 200, 210, 220, 221, 230, 243, 251, 276

Production, Inventory & Tool Control 196

Pumps, Circulating 214

Riveting Machines 204

Saw Blades 36, 94-95, 188, 198, 230

Sawing Machines ..... 36, Insert Bet. 64-65

Screwdriving Machines 271

Screw Machines; Chucking Machines 17, 22-23, 34, 47, 190, 236-237

Shapers, Slotters, Keyseaters 112, 260

Special Machine Tools 24-25, 51, 104-105, 145, 181, 195, 223

Spindles, Machine 260

Steel Blue 260, 262

Tapping Attachments 254

Tapping Machines 24-25, 216

Thread Cutting Machines 10-11, 78

Thread Rolling Machines & Tools 10-11, 55, 82-83, 230

Tools, Cutting ..... 38, 85, 90, 109, 238, Insert Facing 248, 250, 256, 264

Tools, Hand 198, 278

Tools, Measuring 94-95

Tools, Portable 180

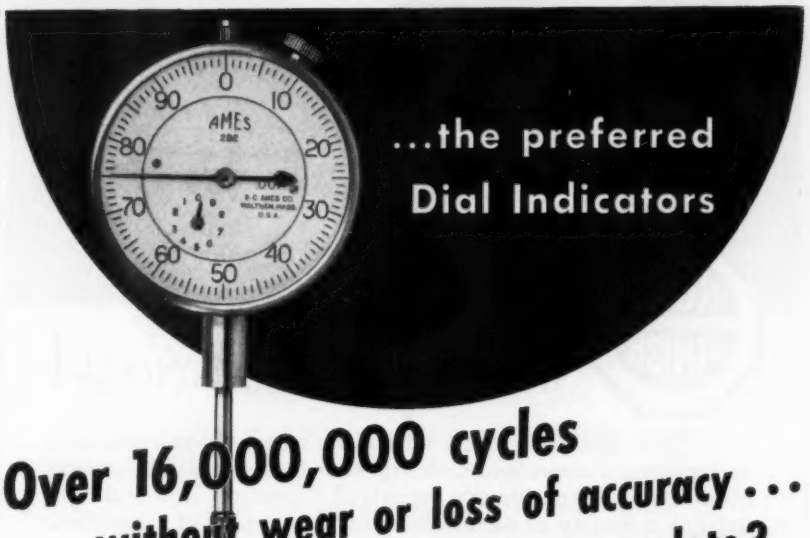
Transportation 244, 257

Used & Surplus Equipment 265-270

Vibration Control 252

Welding & Cutting, Brazing & Soldering Equipment Supplies 256

AMES



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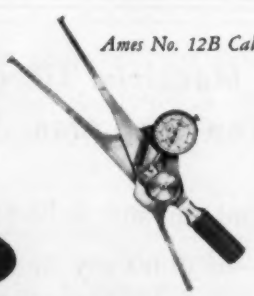

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INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions

	Page
Abrasive Machine Tool Company	245
Acme Industrial Company	277
Acromark Company	260
Alleghany-Ludlum Steel Corp.	50
Allis-Chalmers Manufacturing Co.	65
Allmetal Screw Products Company Inc.	Insert Bet. 168-168E, 194
Altoona Chamber of Commerce	191
Alvord-Polk Tool Co.	256
American Chain & Cable Co., Inc.	57, 186
American Machinist	52-53
American Screw Company	Insert Bet. 168-168E, 242
American Steel & Wire Division	44-45
American Steel Foundries, King Machine Tool Div.	43
American Tool Works	37
Ames Company, B. C.	273
Anderson Oil Co., F. E.	182-183
Armco Steel Corporation	110
Armstrong-Blum Mfg. Co.	36
Armstrong Bros. Tool Co.	64
Atlantic Screw Works Inc., Insert Bet.	168-168E
Avey Drilling Machine Company	86-87
Axelson Mfg. Div. of U. S. Industries Inc.	197
Baldwin-Lima-Hamilton Corp.	243
Barnes Drill Company	218
Barnes Co., W. F. & John	51
Barrett Co., Leon J.	260
Baush Machine Tool Co.	223
Bay State Abrasive Products Co.	192-193
Bay State Tap & Die Company	238
Beatty Machine & Mfg. Co.	200
Behr-Manning Corp.	48-49
Bick, Inc., Hans C.	222
Blake & Johnson Co.	Insert Bet. 168-168E
Blake Co., Edward	278
Blanchard Machine Co.	80
Boyar-Schultz Corp.	219
Brown & Sharpe Mfg. Co.	207
Brush Electronics Company	233
Buhr Machine Tool Co.	195
Bullard Co.	39
Canadian International Trade Fair	263
Capewell Mfg. Co.	198
Carborundum Company	20-21
Carlton Machine Tool Company	72-73
Carpenter Steel Company	241
Central Screw Co.	Insert Bet. 168-168E

INDEX TO ADVERTISERS

	Page
Century Electric Company	77
Cincinnati-Bickford Tool Co.	84
Cincinnati Gear Co.	208
Cincinnati Gilbert Machine Tool Co.	3rd Cover
Cincinnati Lathe & Tool Co.	58-59
Cincinnati Milling Machine Co.	4-5
Cincinnati Milling Products Div. Cincinnati Milling Machine Co.	71
Cincinnati Shaper Company	40-41, 112
Clark Co., Robert H.	258
Clemson Bros., Inc.	230
Cleveland Punch & Shear Works Company	251
Cleveland Twist Drill Co.	Insert Facing 248
Colonial Broach Company	46
Columbia-Geneva Steel Division	44-45
Columbia Tool Steel Company	214
Columbus Die-Tool & Machine Co.	232
Cone Automatic Machine Co.	17
Consolidated Engineering Corp.	252
Continental Screw Co.	Insert Bet. 168-168E
Continental Tool Works Div. Ex-Cell-O Corp.	85
Copperweld Steel Company	150
Covel Manufacturing Company	240
Crane Packing Co.	213
Cro-Plate Co.	252
Cross Company	145
Crucible Steel Co. of America	54
Danly Machine Specialties Inc.	66-67, 96
Davis Keyseater Company	260
Davis & Thompson Co.	275
Dayton Rogers Mfg. Co.	262
DeLaval Separator Company	209
De Laval Steam Turbine Co.	224
Detroit Power Screwdriver Co.	271
DeVilbiss Co.	226-227
Die Supply Co., Subsidiary of E. W. Bliss Company	63
Disston & Sons, Inc., Henry	188
DoAll Company	Insert Bet. 64-65
DuPont de Nemours & Co., Inc. E. I. Electrochemicals Dept.	249
Dykem Company	260
Eagle Lock Co.	Insert Bet. 168-168E
Eagle-Picher Sales Company	206
Eastern Machine Screw Corporation	256
Eastman Kodak Co., Special Products Division	199
Eisler Engineering Co., Inc.	232
Elco Tool & Screw Corp.	Insert Bet. 168-168E
Erickson Tool Company	248

(*Continued on page 276*)

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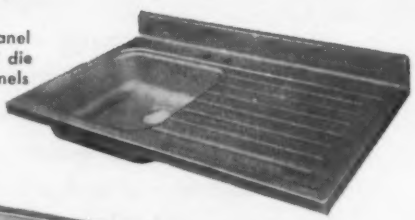

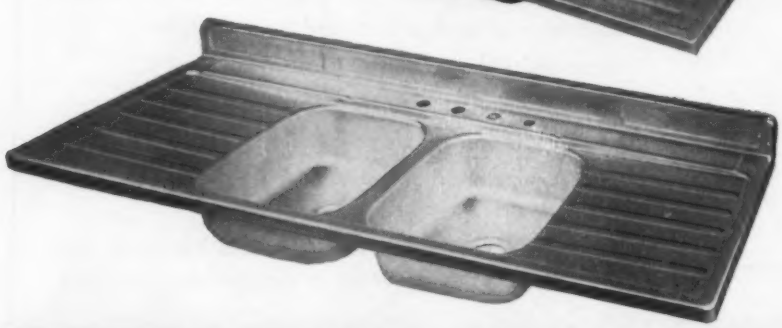

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INDEX TO ADVERTISERS

(Continued from page 275)

	Page
Ex-Cell-O Corporation	85, 98
Federal Machine & Welder Co.	210
Federal Products Corp.	169
Fellows Gear Shaper Company	6-7
Field & Son, Walter	256
Fosdick Machine Tool Company	30-31
Frauenthal Div. Kaydon Engineering Corp.	228-229
Gear Grinding Machine Co.	236-237
General Electric Apparatus Dept.	68-69
German American Trade Promotion	258
Giddings & Lewis Machine Tool Company	14-15
Gisholt Machine Company	70
Gleason Works	3
Goss & DeLeeuw Machine Company	190
Gottschalk Co., Inc., Ernest	272
Grant Mfg. & Machine Company	232
Gray Co., G. A.	28-29
Great Lakes Screw Corp.	Insert Bet. 168-168E
Gulf Oil Corporation	185
Hamilton Tool Co.	102
Hannifin Corp.	194
Hardinge Brothers, Inc.	88
Harper Co., H. M.	Insert Bet. 168-168E
Hartford Special Machinery Co.	230
Harvey Aluminum Sales Inc.	189
Heald Machine Company	2nd Cover
Holcroft & Company	Insert Bet. 232-233
Hones, Inc., Charles A.	258
Howe & Fant	216
Index Machine Co.	262
Industrial Metal Products Corp	187
Jahn Manufacturing Co., B.	220
Johnson & Son, Inc., S. C.	177
Jones & Lamson Machine Company	42, 56
Kaiser Aluminum & Chemical Sales Inc.	234-235
Kearney & Trecker Corp.	26-27
Kent-Owens Machine Company	225
King, Andrew	260
King Machine Tool Div. American Steel Foundries	43
Krueger-Barnes Corp.	181
Lamson & Sessions Co.	Insert Bet. 168-168E
Landis Machine Company	10-11
Landis Tool Company	12-13

INDEX TO ADVERTISERS

	Page
LaPointe Machine Tool Company	148
Lavallee & Ide Inc.	90
LeBlond Machine Tool Co., R. K.	74-75
Lees-Bradner Company	78
Lemert Engineering Co.	204
Linley Brothers Co.	275
Lodge & Shipley Company	76
Luers, J. Milton	232
Mackintosh-Hemphill Co.	247
Manheim Mfg. & Belting Company	171
Marvel Tool & Machine Co.	250
Maschinenfabrik Lorenz, A. G.	264
Mattison Machine Works	280
Mayes Tool Company	250
M.B.I. Export & Import Ltd.	258
McCaskey Register Div. Victor Adding Machine Company	196
McGraw-Hill Book Co., Inc.	262
Micromatic Hone Corp.	81
Miller Electric Mfg. Co.	256
Millers Falls Company	180
Minster Machine Company	221
Moore Special Tool Co., Inc.	246
Morris Machine Tool Co.	175
Mueller Brass Company	211
National Acme Company	47
National Automatic Tool Co.	24-25
National Lock Co.	Insert Bet. 168-168E
National Screw & Mfg. Co.	Insert Bet. 32-33, 33, 34-35
New Britain Machine Company, The	Insert Bet. 32-33, 33-34, 35
Nichols-Morris Corp.	217
Nicholson File Company	Insert Bet. 200-201
Noble & Westbrook Mfg. Co.	92
Norton Company	18-19
Oliver Instrument Company	93
Parker-Kalon Div General American Transportation Corp	Insert Bet. 168-168E
Pheoll Manufacturing Co.	Insert Bet. 168-168E
Pines Engineering Co. Inc.	261
Podlin Tool Co.	278
Pope Machinery Corp.	260
Railway Express, Air Express Div.	244
Randall Co., Inc., Frank E.	277
Ransburg Electro-Coating Corp.	212
Reed Rolled Thread Die Company	82-83
Reid Brothers Co., Inc.	91

(*Continued on page* 278)

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precision or oversized

Sizes range from 3/8" to 6" in length—1/8" to 1" in diameter. Precision pins are hardened and ground to .0002" or .001" over nominal diameter—oversized from .002" to .005".

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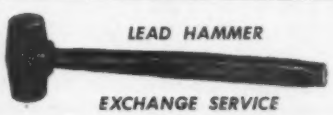

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INDEX TO ADVERTISERS

(*Continued from page 277*)

	Page
Republic Steel Corp.	60-61
Rockford Machine Tool Company	215
Rockford Screw Products Co.	Insert Bet. 168-168E
Roto-Finish Company	274
Ruthman Machinery Company	214
Scherr Co., Inc., George	276
Scovill Manufacturing Co.	Insert Bet. 168-168E
Screw Research Association	Insert Bet. 168-168E
Scully-Jones & Company	179
Seaboard Steel Co. of America	208
Shakeproof Div. Illinois Tool Works	Insert Bet. 168-168E
Sheffield Corp.	55
Sheldon Machine Co. Inc.	279
Shore Instrument & Mfg. Co. Inc.	256
S. K. F. Industries Inc.	62
Snyder Tool & Engineering Co.	104-105
Somma Tool Company, Inc.	230
South Bend Lathe Works	259
Southington Hdwe. Mfg. Co.	Insert Bet. 168-168E
Square D Company	173
Standard Pressed Steel Co.	203
Standard Tool Company	38
Star Kimble Motor Div. Miehle Printing Press & Mfg. Co.	184
Starrett Co., L. S., The	94-95
Sterling Bolt Company	Insert Bet. 168-168E
Stuart Oil Co. Ltd., D. A.	89
Sun Oil Co.	239
Surface Combustion Corp.	255
Taft-Peirce Mfg. Company	100
Tennessee Coal & Iron Div.	44-45
Texas Co.	106
Timken Roller Bearing Company Steel & Tube Div.	4th Cover
Tomkins-Johnson Company	109
Turchan Follower Machine Company	231
United Air Lines	257
U. S. Burke Machine Tool Company	248B
U. S. Industrial Tools	262
United States Steel Export Co.	44-45
U. S. Rubber Co.	253
United States Steel Corp.	44-45
United States Steel Supply Div. United States Steel Corp.	79
United Tool & Die Company	276
Universal Screw Company	Insert Bet. 168-168E

INDEX TO ADVERTISERS

	Page
Van Keuren Co.	16
Van Norman Company	8-9
Vascoloy-Ramet Corp.	152
Veeder-Root Inc.	32
Verson Allsteel Press Co.	146
Wales-Beach Corp.	Insert Bet. 168-168E
Waltham Machine Works Inc.	232
Warner & Swasey Company	22-23
Weldon Tool Company	250
Wilson Mechanical Instrument Div. American Chain & Cable Co. Inc.	186
Wright Hoist Division, American Chain & Cable Co. Inc.	57
Youngstown Sheet & Tube Company	205
Zagar Tools Inc.	254

SEARCHLIGHT SECTION
(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
- Positions Vacant 264
- Selling Opportunities Offered 264

SPECIAL SERVICES
- Contract Work 264
- Eastern Machine Screw Corp. 264
- General Pattern Works 264
- Rebuilding 269, 270

EDUCATIONAL
- Books 264

BUSINESS OPPORTUNITIES
- Offered 264

EQUIPMENT
(Used or Surplus New)
- For Rent 269
- For Sale 265-270

WANTED
- Equipment 270

ADVERTISERS INDEX

Aaron Machinery Co., Inc.	266
Ball Machinery Company	269
Barron Machinery Co.	267
Bennett Machinery Co.	269
Bird Specialty Company	270
Brownell Machine Tool, Inc., Hazard	265
Cincinnati Machinery Company	269
Dony Machinery Company	268
Eastern Machinery Co., Inc.	266
Edwards & Assoc., Ray	264
Falk Mill Supply Co., Inc.	267
Hill-Clarke Machinery Co.	267
Hyman & Sons, Jos.	266, 269, 270
Indianapolis Machinery & Supply Co.	266
Industrial Renting Corp.	269
Machine Tool Publications	264
McDonald Machinery Co.	270
Miles Machinery Company	268
Morey Machinery Co., Inc.	265
Motch & Merryweather Machinery Co.	270
Municipal Tool & Machinery Co.	268
National Machinery Exchange	269
Noll Equipment Company	267
O'Connell Machinery Co.	268
Peacock Corp.	264
Samson Machinery Co.	270
Smith Machinery Sales, Ed.	268
Triplex Machine Tool Corp.	265
Wigglesworth Industrial Corp.	269

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NEW Sebastian
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$1875.00
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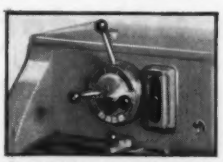
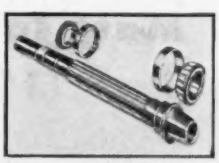
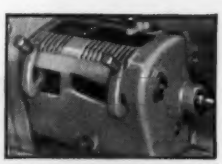


Speed changes easily made by revolving speed dial on headstock



Heavy, multiple Splined Spindle with "Zero Precision" tapered roller bearings



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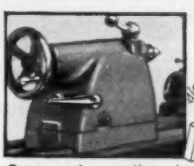

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Write for circulars on 13" and 15" Sebastian lathes and name of nearest dealer where you can see and operate these outstanding lathes.

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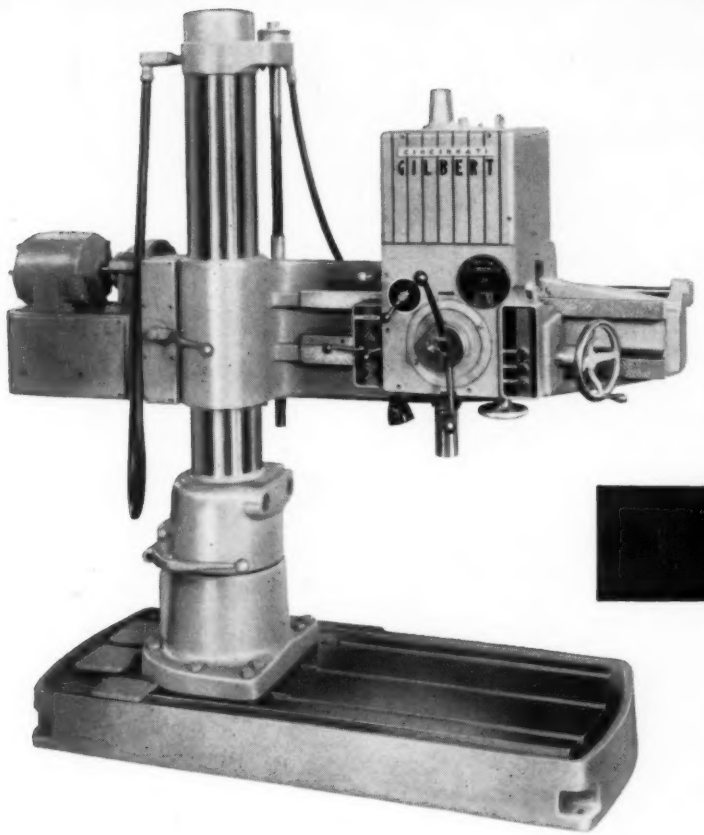

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(feel remains the same from lightest to heaviest tools)
- hardened tang slot
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2. Lathe centers
3. Slitting rolls and knives
4. Cam rollers for automotive steering gears
5. Machine tool parts
6. Pump parts
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8. Mechanical seals
9. Saw mill rollers
10. Ball bearings
11. Asbestos disintegrators
12. Mill rolls

...and get all these advantages:

1. Hard
2. Tough
3. Machines easily
4. Exceptional wear-resistance
5. High tensile strength
6. Withstands working pressure of 200,000 p.s.i.

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